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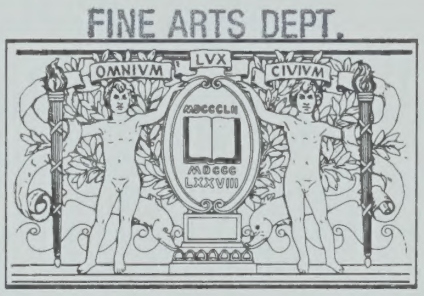

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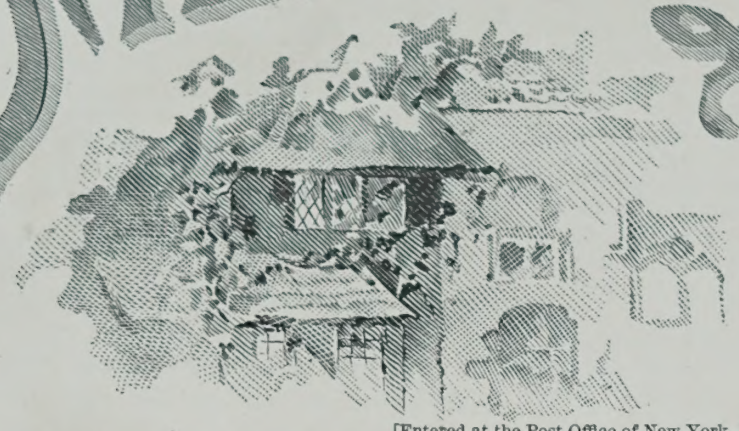

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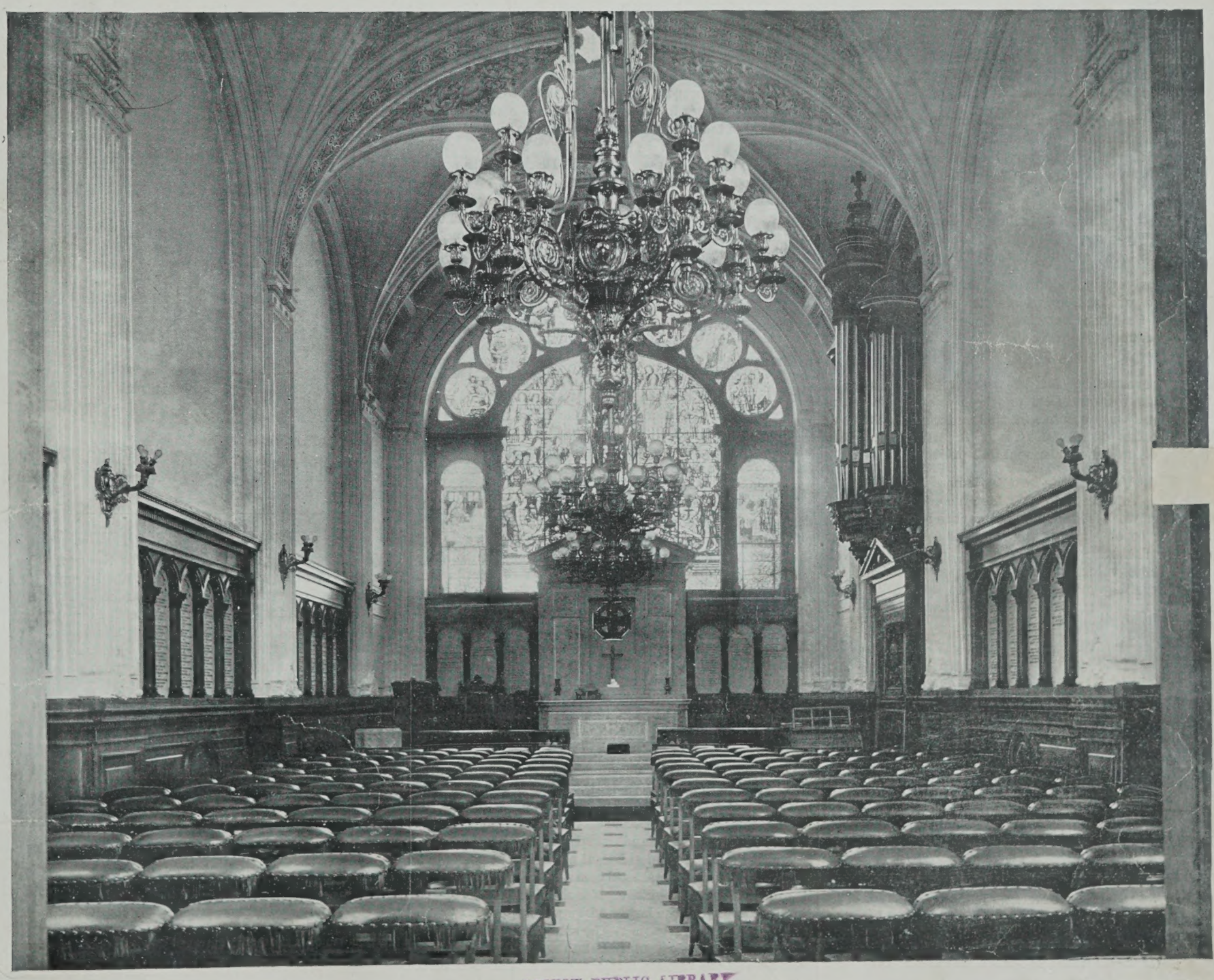

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INTERIOR VIEW OF CHAPEL, S[illegible]UKE'S HOSPITAL.—See page 16.

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THE
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THE RELATION BETWEEN THE LANDSCAPE GARDENER AND THE ARCHITECT.

It is an encouraging sign of the times that the various professions which are devoted to the arts of construction are beginning to realize that they are related to one another by certain natural ties, and that the best results can only be obtained when they recognize this relationship and act up to its full obligations. The tendency to specialization in the professions which is so noticeable to-day is the same that has brought about the existence of these separate professions themselves. The progress of invention and knowledge, especially in the present century, has been so rapid that it is as much as any one man can do to keep abreast of the advance of knowledge in any one department. The day of the all round professional man, who might be engineer, architect, and even the landscape artist in one, has gone for good. At the same time it should be remembered that the separation has taken place as a matter of convenience, and not because of any distinct and necessary lines of demarkation.

Engineering, architecture, and landscape gardening—to take the three professions which have done so much to improve the conditions and surroundings of daily life—while they differ widely in the material and forms in which they work, are nevertheless closely related, and are governed in their exercise—or should be—by certain laws of art, which each profession is bound to observe, if its own work is to be in harmony with that of the others. Originally, the three professions were often combined in one man, and to this fact, no doubt, are due the harmonious appearance and studied proportion which are discernible in the remains of the classic cities, suburbs, and private villas of Italy—a beauty which the storms of nearly twenty centuries have failed to obliterate. This beauty is lasting because it is inherent. Had it consisted in mere individual and external adornment—had each roadway, bridge, building or garden been laid out with no reference to the claims of its surroundings, the ruins would have been mere rubbish heaps, impotent to delight the eye or fire the imagination of a later age.

The wonderful material growth of the present century, with the complex problems which the march of invention and discovery has introduced into the various professions, has tended to make the engineer, the architect, and the landscape artist drift farther apart than the exigencies of the case demanded. Many of the public works of our day fail in their general effect for want of that harmony which can only be gained by a collaboration from the very outset of all the parties who are concerned in their execution.

It promises well for the future, however, that the need for this collaboration is being actively urged both by public officials and by the technical press; and the recent recommendation of the Commissioners of the New East River Bridge that an architect should be called in to co operate with the engineer in designing the architectural features will be fresh in the memory of our readers.

We think, however, that there is room for further co-operation in another direction on the part of the architect, which is even more important in its bearing upon public works than the foregoing, and comes home more closely to the every-day life of the people—we refer to the co-operation of the architect with the landscape gardener.

The most important field for the display of harmonious design as the result of this collaboration is in the laying out of national and city parks, suburban driveways, and the various squares and gardens which are continually being opened up in the crowded centres of population. Of all these public works, the suburban parks afford the finest opportunity for the display of good judgment and fine artistic sense. The ever varying natural features of the sites will call for an equally diverse variety of treatment by the landscape gardener in adopting and accentuating their natural beauties and hiding their defects, and by the architect in adapting the style of the various buildings of the parks to their immediate surroundings, and yet maintaining a certain general harmony among them all.

The opportunities for the display of their united skill will increase in proportion to the natural diversities of the site. Rocky and precipitous ground will call for widely different architectural treatment from gently rolling or level grass lands; and before the landscape gardener determines upon a final plan of treatment for a particular locality, he should consult the architect as to its architectural possibilities. Nor should this discrimination be confined to the larger and more important buildings. It should take note of the smaller details, such as the design of balustrades, retaining walls, the foot bridges, and the various forms of ornamental ironwork.

The co-operation of architect and gardener is no less important in domestic architecture. Pretty as many of our suburban homes now are, they might have been rendered far more picturesque, if the landscape artist had been consulted as to the laying out of the grounds and the style of building that would best harmonize with his plan. Great have been the sins of omission and commission on the part of the speculative architect and builder in the erection of suburban homes. Many a lovely site, which nature had beautified with rocks and trees and gentle slopes, has been ruthlessly stripped and "graded," and a stiff, boxlike "villa" perched in naked ugliness in its centre, when half an hour's consultation between architect and gardener might have resulted in a picturesque, tree-embowered cottage, set in evergreen shrubberies that suggest the sweetness and the careless growth of the country.

Fortunately there are many signs that we are waking up to the importance of this question, especially in the matter of suburban homes, one of the most promising of which is the tendency to lay out our suburbs in the form of parks, such as we have from time to time illustrated in previous issues. Here we have a systematic attempt to make the architecture and the grounds harmonize with the natural features of the site, and the results speak for themselves. It now remains for the builder of the detached villa to carry out the same principles. When he does so, we shall see a marked improvement in the appearance of our rapidly growing suburbs, and the "wilderness of houses" will cease to obtrude itself with its bald monotony and weary reiteration of design.

AN $1,800 COTTAGE AT BINGHAMTON, N. Y.

We present herewith in this issue, on page 4, one of the most unique designs for a model surburban cottage, which has been recently erected for E. H. Titchener, Esq., at Binghamton, N. Y. The engraving presents a design of unusual beauty, and although the lines are square, the detail is pronounced in its paneled gables and its latticed window effects, which add much to give it the artistic values so successfully sought. It is a difficult matter to secure a combination of pleasing elevations and well-arranged plans, and especially at so low a cost. The underpinning is built of stone laid up in a neat manner. The superstructure is built of wood, and the exterior framework is sheathed, papered and clapboarded, and then painted bottle-green with ivory-white trimmings The roof is covered with tin shingle, painted a slate color and finished with a cresting and finials. Dimensions: Front, 28 ft.; side, 52 ft., not including porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with whitewood. The hall has a paneled wainscoting and an ornamental staircase with spindle newel posts and balusters, and also a floor laid with oak. The parlor has an octagon projection, and is separated from sitting-room by double sliding doors. The sitting-room contains an open fireplace, with tiled hearth and facings and a mantel of cherry handsomely carved. A window seat is provided at one side, while a bookcase is built in on the other side of the fireplace. The dining-room is stained and finished in oak, and is fitted up with an oak floor and a buffet built in. Kitchen is wainscoted with narrow-beaded stuff, and is furnished complete with dresser, sink, pantry, shed and all necessary fixtures. The second floor contains four bedrooms, each having large closets, and a bathroom, wainscoted and fitted up with porcelain fixtures and exposed plumbing. The third floor contains two bedrooms and ample storage Cemented cellar contains furnace, laundry and other apartments. Cost $1,800 complete. Messrs. Lacey & Bartoo, architects, Binghamton, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

WELSH CHURCH AT CARDIFF.

We present on page 3 a design for the new Welsh Church at Cardiff, which is to be built upon a site given by Lord Tredegar in the Howard Gardens. It will be exclusively used for services in the Welsh language, and is to be dedicated to Saint David. The plans show accommodation for 450 worshipers. Externally it will be faced with hammer-dressed gray Pennant stone, with dressings in box ground stone. The design throughout is in the Perpendicular style, and the more enriched work will be concentrated internally on the chancel and reredos. The architect is Mr. Bruce Vaughan, A.R.I.B.A., of Cardiff.

We are indebted to *The Building News* for the engraving and particulars.

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RESIDENCE AT CHEVY CHASE, MD.

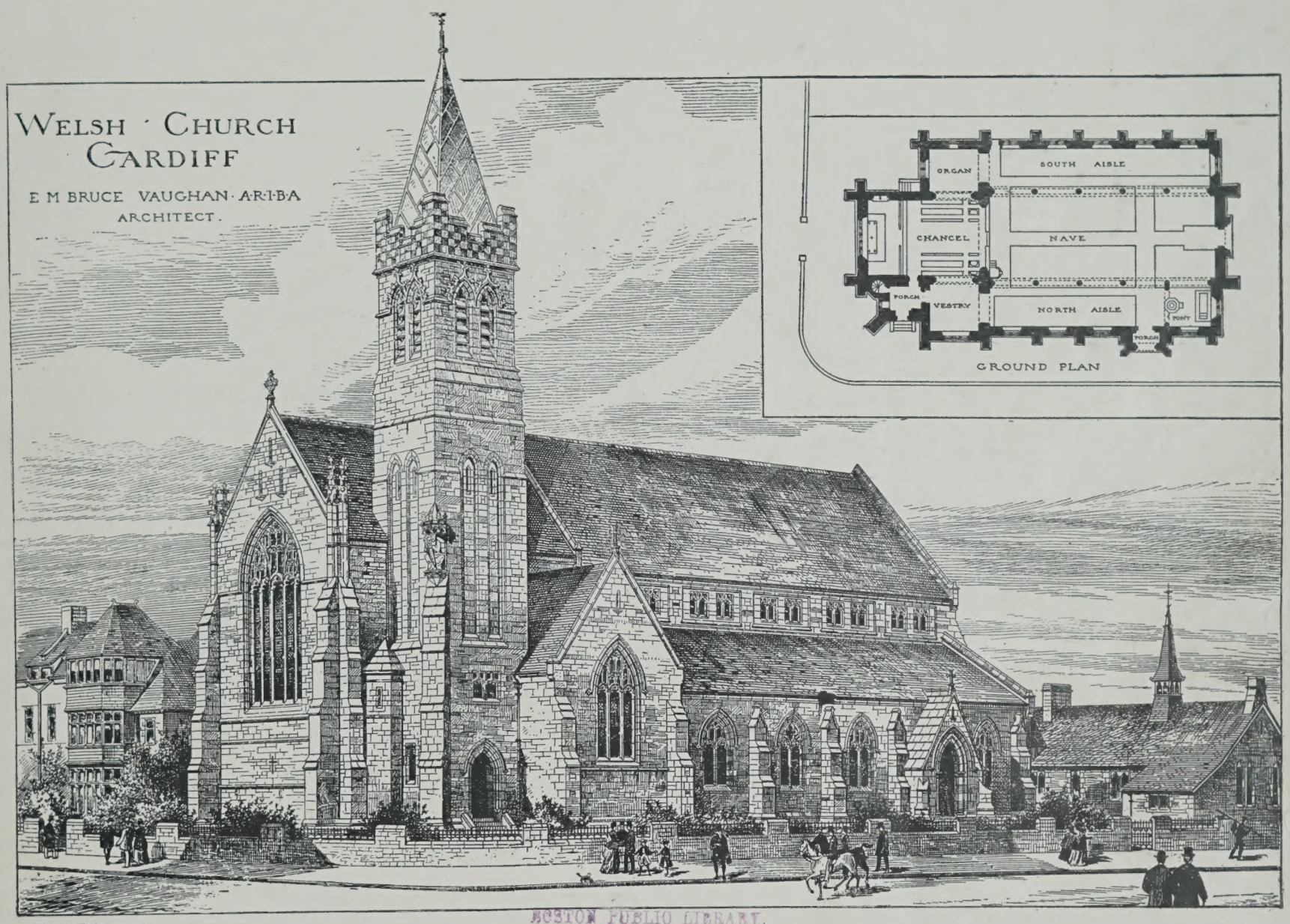
Our illustrations on page 5 show a residence erected at Chevy Chase, Md., designed in the Colonial style. The first story walls are built of red brick, in white mortar joints. Foundations are brick and rubble stone. The sides adjoining porches are of studding, and exterior sheathed, and covered with shingles. Above the first story the entire structure is framed, and roof, sides and gables are sheathed and shingled. All trimmings, headers, belts and cornices are painted white, while the body of building is tinted a dark gray, which contrasts well with the red brickwork of chimneys and first story walls. Wide and roomy porches are on either side, and have no direct communication with main entrance porch. All the windows are unusually wide, and those leading to porches from parlor and drawing-room reach to the floor. The hall is entered through handsome glazed double doors in front and vestibule. On both sides are wide double arches, moulded in plaster, with a circular column in centre and fluted pilaster at sides. This arrangement gives an unobstructed view of drawing-room and parlor, with a portion of the dining-room beyond. Newels, balusters and rails of staircase are hardwood, and handsomely carved, turned and moulded. The side walls and ceiltion of plaster work, clapboards and shingles; the plaster work is pebble-dashed and finished in its natural color; the clapboards are painted olive green, while the shingles are painted red, and trimmings bottle green. The roof is covered with octagonal-cut slates. Underpinning built of brick. Dimensions: Front, 48 ft. 6 in.; side, 42 ft. 6 in., not including porches. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft.

The interior throughout is trimmed with whitewood and finished natural. The halls contain ornamental staircases turned out of similar wood, with newels, balusters and rails. The parlors, spacious and well lighted, have piano windows, glazed with stained glass and open fireplaces built of brick, and trimmed with tiled hearths and facings, and hardwood mantels. Dining-rooms have cluster windows, with leaded lights and a window running to floor and opening out upon porches. Kitchens and pantries are wainscoted, and each apartment is fitted up with the best modern fixtures. The second floor in each house contains a large open hall, four bedrooms and bath, the latter wainscoted and provided with the usual fixtures complete. Third floor contains studios and bedrooms. Cemented cellars contain furnaces, laundries and other necessary apartments. Cost $5,000 each, containing range, sink, dressers, drawers and cupboards complete. The second floor contains three bedrooms, ample closets and storage room. This floor is treated with china white in a dainty manner, and the walls are papered to correspond with the trim. Cemented cellar under whole of building contains ample storage. Mr. Warren R. Briggs, architect, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT SCRANTON, PA.

We present on page 10 an illustration of a cottage recently completed for Mr. T. Q. Lacey, at Scranton, Pa. The design is of the gambrel roof order style, with Colonial detail, and it combines both pleasing elevations and well-arranged plans. The underpinning and first story are built of Forest City stone of bluish-gray color, well jointed, and with faces left rough as they came from the quarry. The rear extension is built of wood and covered with clapboards and painted a light gray. The second story is beamed, forming panels, which are filled in with plaster work and treated in its natural color; the



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WELSH CHURCH AT CARDIFF.—See page 2.

ings are frescoed in a delicate cream color. The kitchen arrangements are very convenient. A rear staircase leads to laundry below, and up to second story. Two doors separate the room from the main hall and dining-room, completely isolating it from the other rooms. The pantry contains a sink, cupboard, etc., and two china closets occupy angles in the dining-room. The second story contains five chambers and bathroom, with balconies from principal rooms. There are three open fireplaces, at least one closet to each bedroom, and the rear staircase, which continues up to attic. The rooms are large, airy, and well lighted. The attic is divided into servants' rooms, storage, etc. The dimensions of building are: Length of front, 38 ft.; side, 35 ft. 6 in., not including porches. Height of stories: Cellar, 8 ft.; first floor, 9 ft. 6 in.; second floor, 9 ft.; and attic, 8 ft. The architect is Louis D. Meline, Washington, D. C.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODEL DOUBLE DWELLING AT NEWARK, N. J.

We present in this issue, on page 14, a double dwelling-house, which has recently been erected for Mrs. J. T. Roberts, at Newark, N. J. The illustrations present a design showing a model double dwelling-house, which is treated in the English style of architecture. It has many good features and an excellent plan. The materials used in the construction are of the best, and the workmanship first class in every respect. The exterior is a combinaplete. Mr. Charles A. Gifford, architect, 58 Broadway, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A GATE LODGE AT "GRASMERE," FAIRFIELD, CONN.

We present on page 12, in this issue, a Gate Lodge, which has been erected for Dr. Ira De Ver Warner at "Grasmere," Fairfield, Conn. The design is unique and picturesque for a building of this character, and it also has a well and conveniently arranged plan. The foundation and underpinning are built of local stone laid up in a neat manner. The chimney is topped out with field stone laid up at random. The exterior framework is sheathed and then covered with shingles, which are left to weather finish, while the trimmings are painted bottle green. The roof is also shingled. Dimensions: Front, 29 ft.; side, 39 ft., not including porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in. The hall is treated in china white, and contains a stairway to cellar and to second floor, with a window on landing. The remainder of the rooms on first floor are trimmed with ash. The parlor is a sunny and pleasant room, while the sitting-room has an octagonal projection thrown out at one end. Dining-room contains an open fireplace, and it has a paneled wainscoting. The fireplace has a brick hearth and facings. This room is also provided with a large pantry and a cooking-room contrimmings painted white. The gables are shingled and stained sienna. The roof is shingled and stained a dark brown color. Dimensions: Front, 32 ft.: side, 46 ft., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The reception hall is a spacious apartment and is trimmed with antique oak. It is provided with a lobby with tiled floor, a paneled divan, and an open fireplace built of pressed brick, with hearth facings and mantel of same. The staircase is of handsome design, and it has a column extending to ceiling and forming an arcaded effect. Parlor is treated with china white in a dainty manner. Den is trimmed with oak and is conveniently located. Dining-room is trimmed with quartered oak, and it contains an alcove for buffet and a butler's pantry well fitted up with shelves, drawers and cupboards. Kitchen and stairway are trimmed and wainscoted with whitewood finished natural and provided with the best modern fixtures. The second floor is trimmed with whitewood, and it contains three bedrooms, two servant bedrooms, nine closets and bathroom. Bathroom is paved and wainscoted with white English tiling, and fitted up with porcelain fixtures and exposed plumbing. Third floor contains two bedrooms and ample storage. Cemented cellar contains furnace, laundry and other necessary apartments. Mr. T. Q. Lacey, architect, Scranton, Pa.

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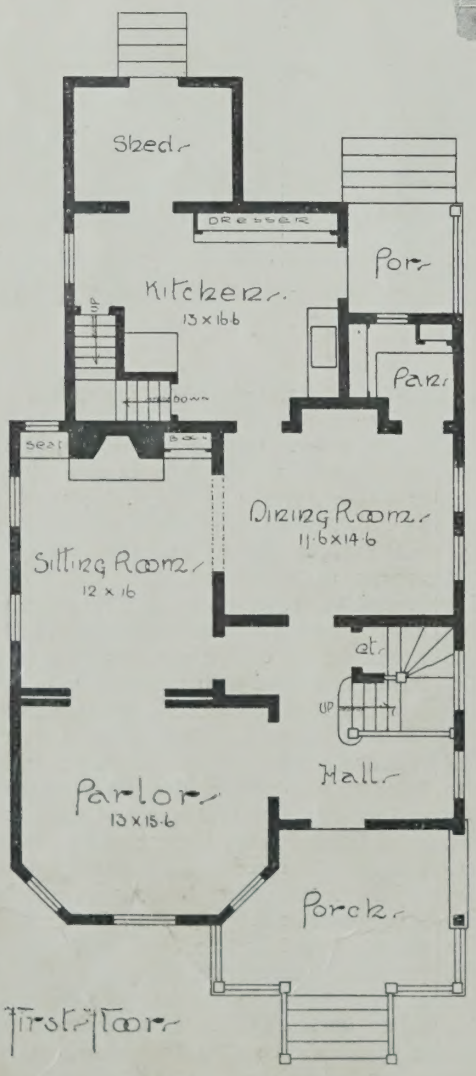

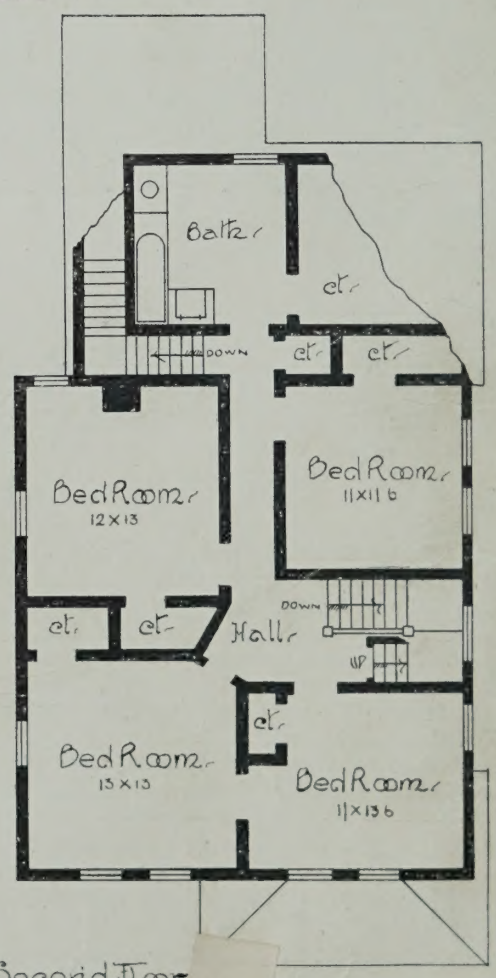

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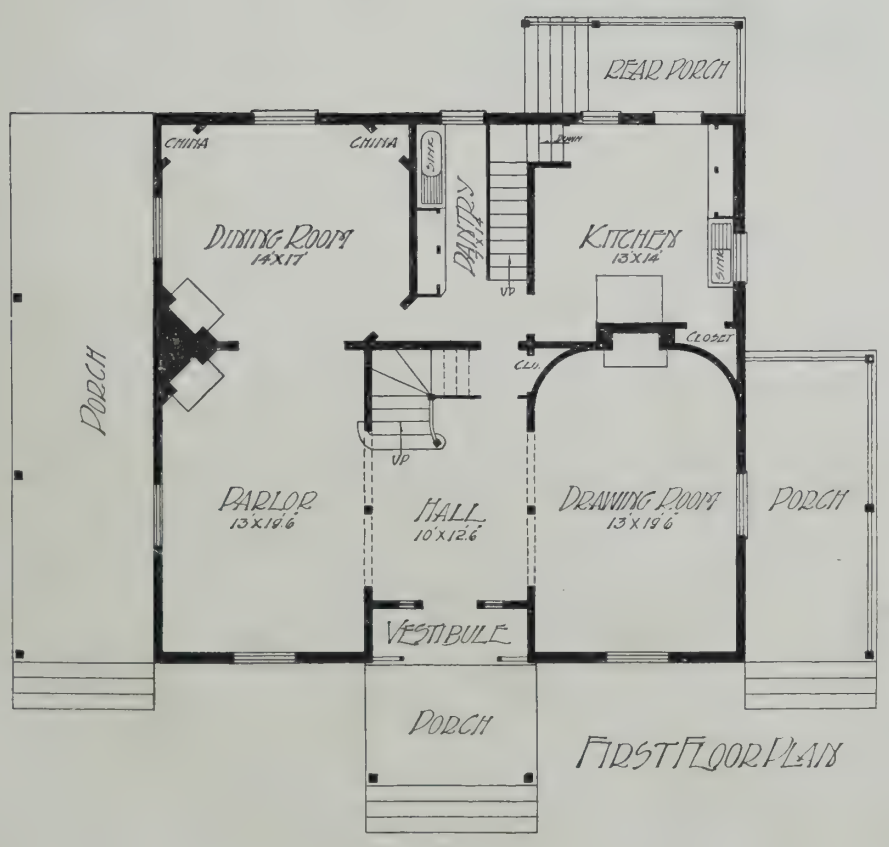

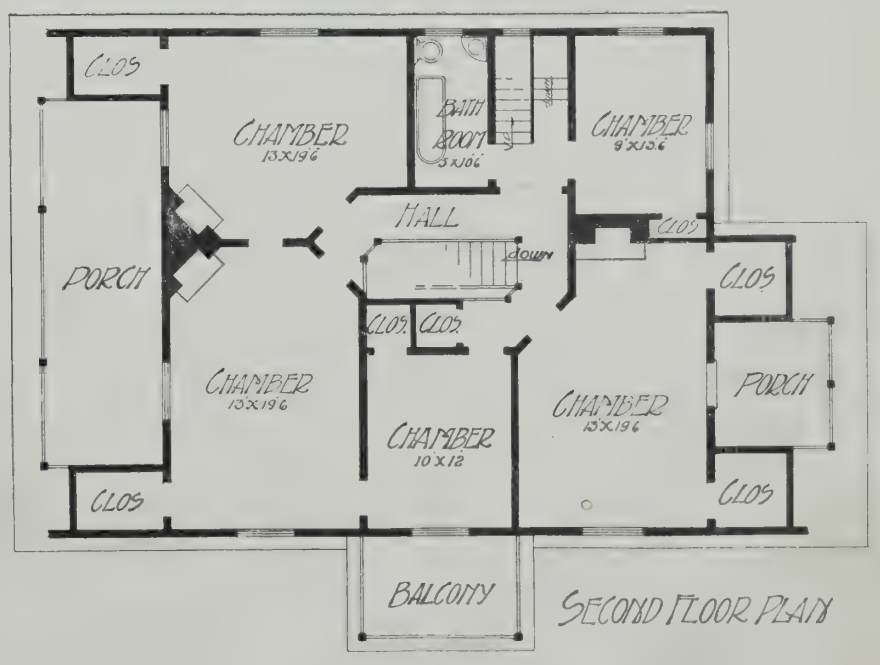

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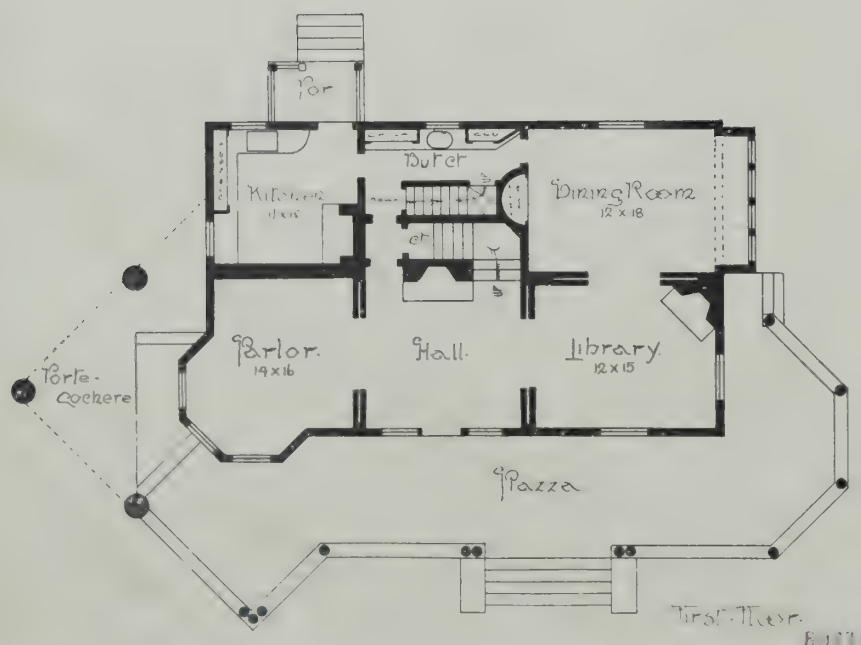

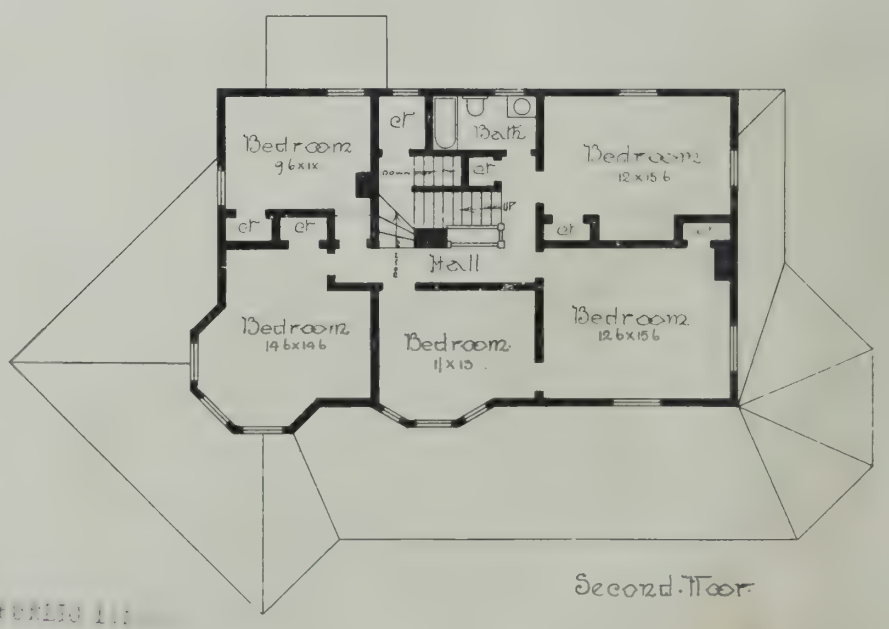

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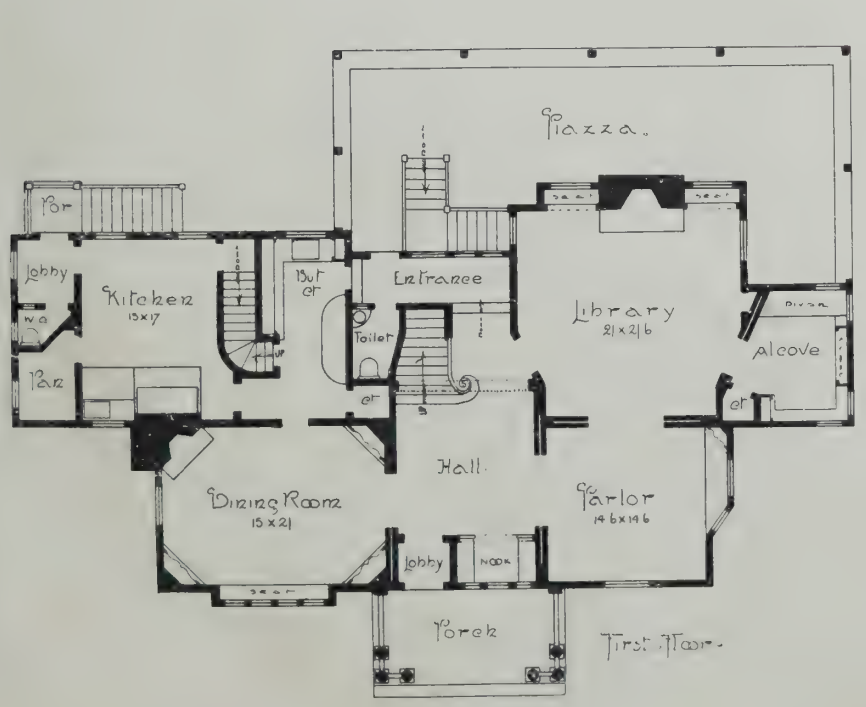

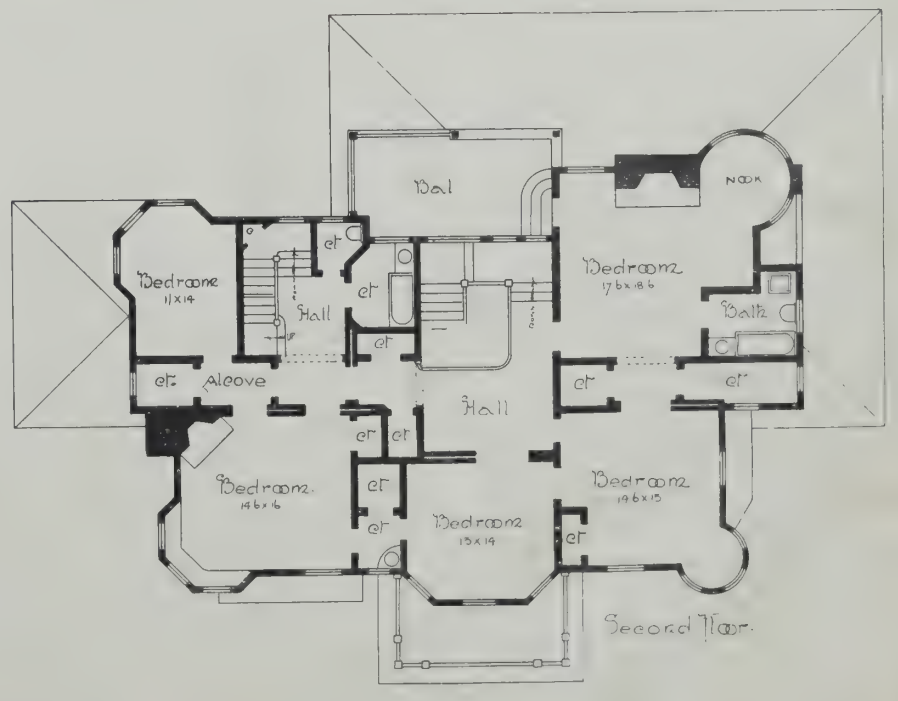

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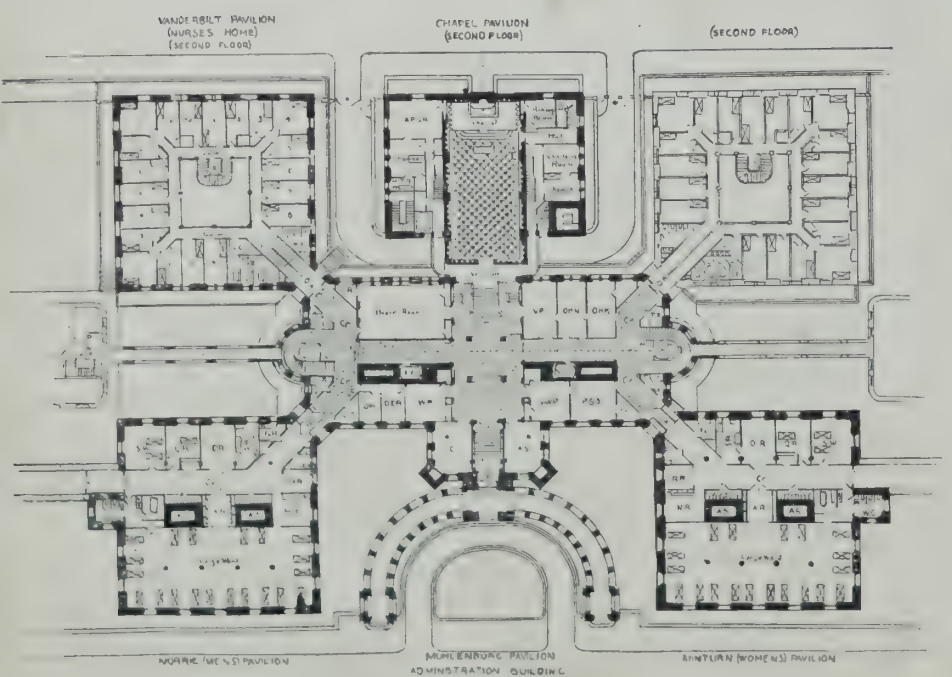

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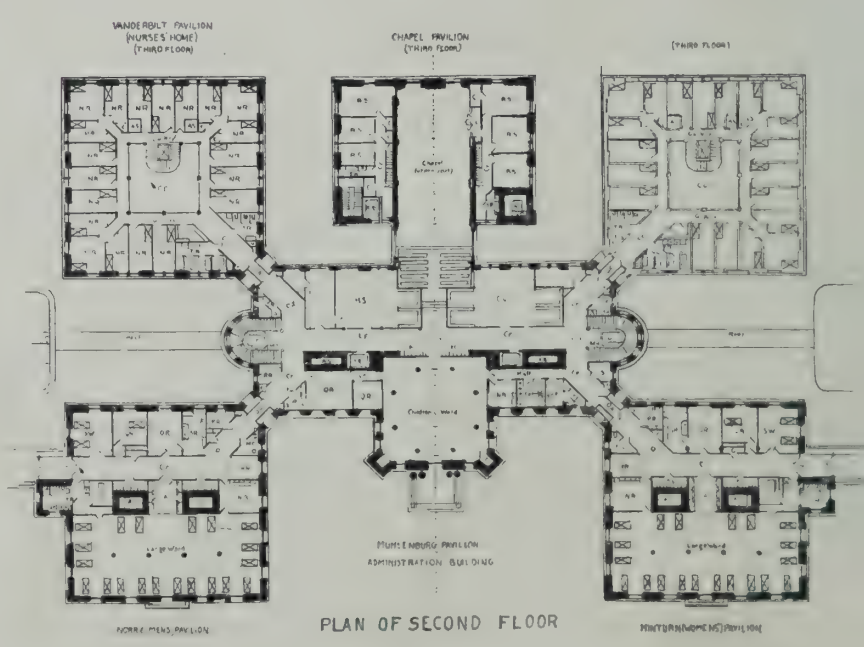

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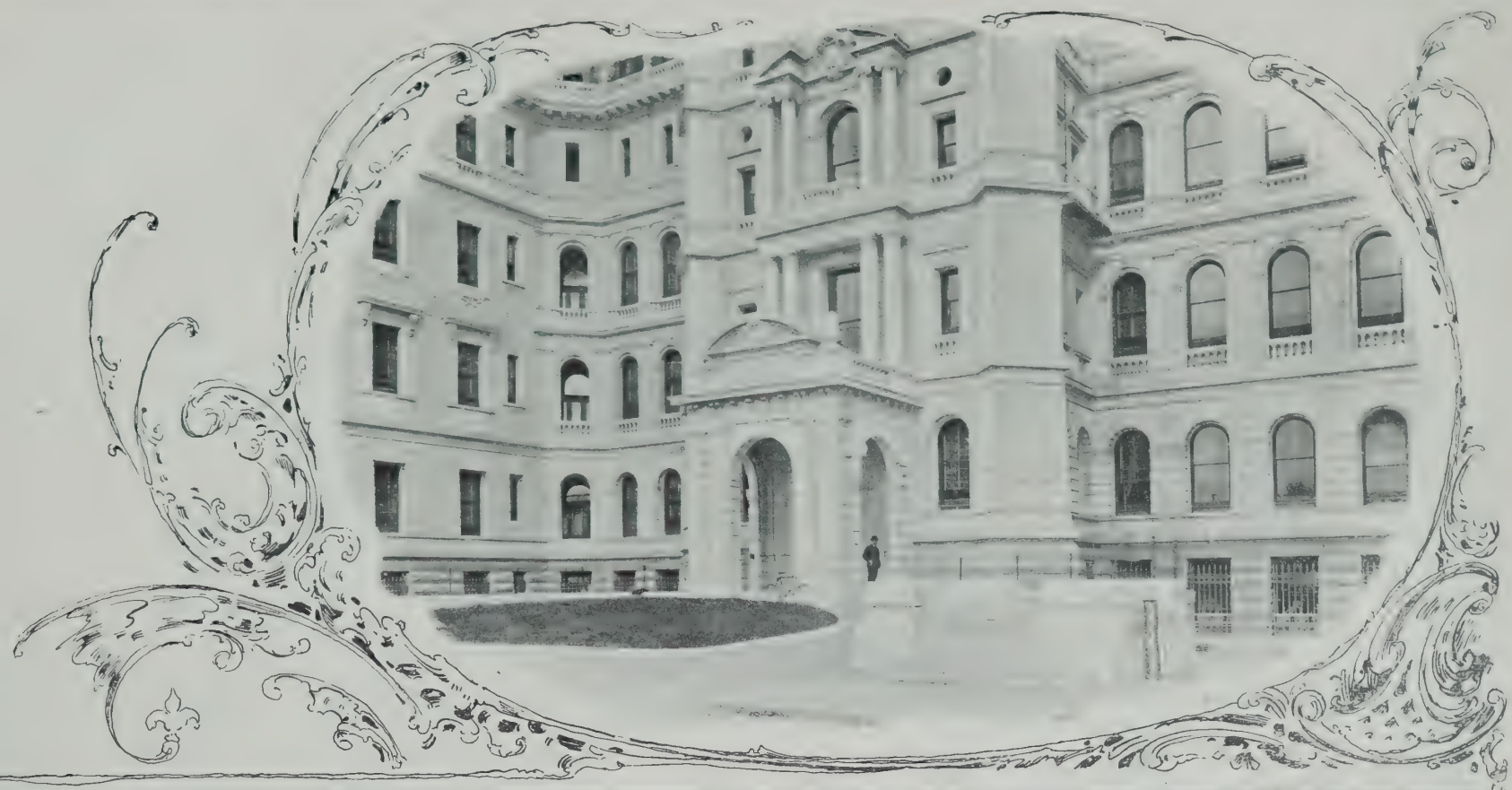

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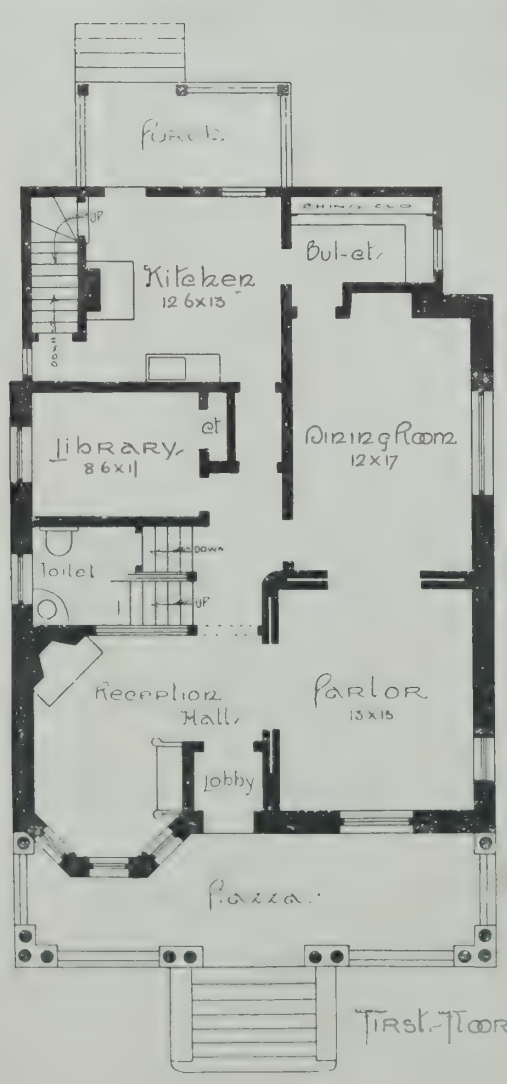

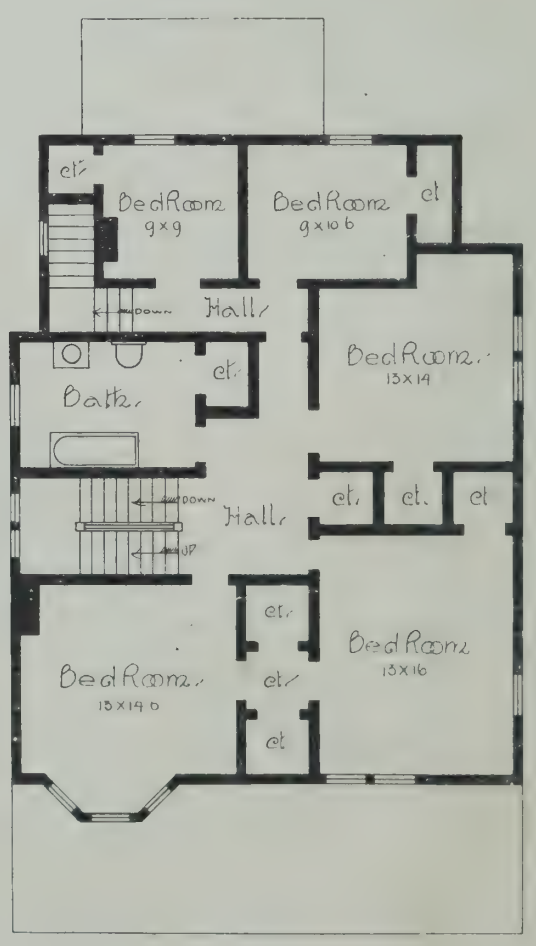

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A COTTAGE AT SCRANTON, PA.—See page 3.

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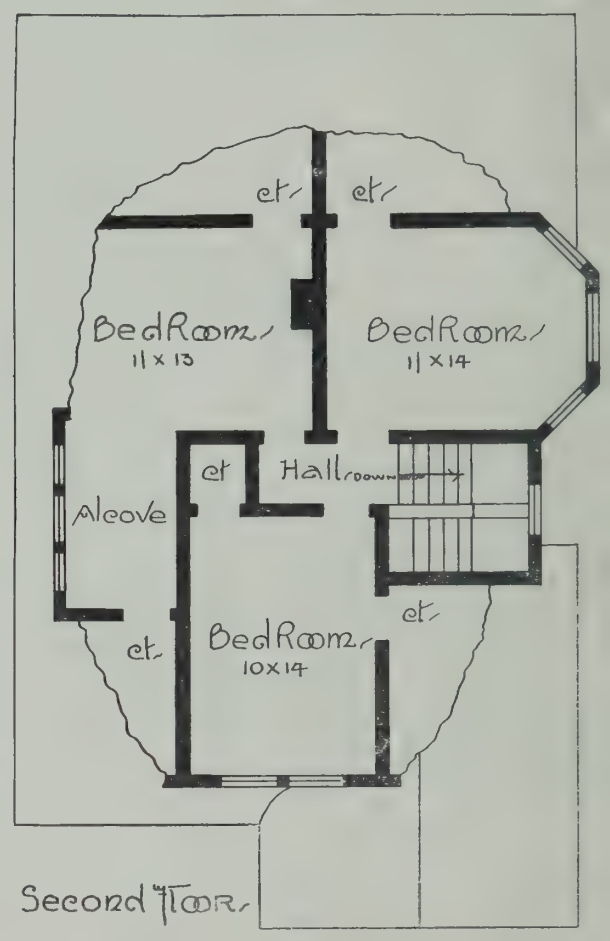
RESIDENCE OF LEON DESSEZ, ESQ., WASHINGTON, D. C.—See page 17.



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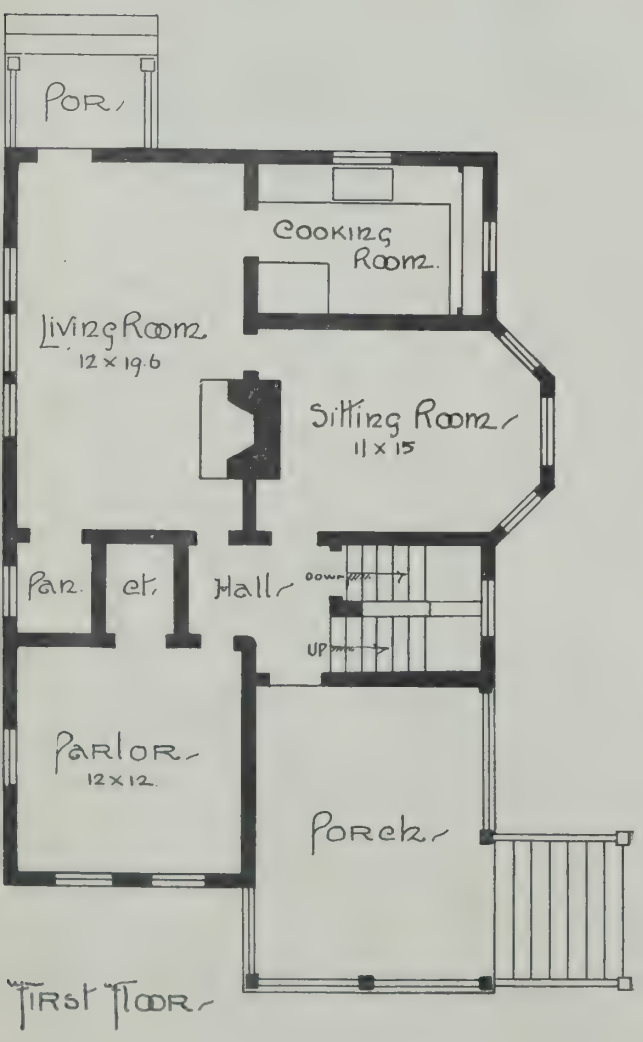

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A GATE LODGE AT "GRASMERE," FAIRFIELD, CONN.—See page 3.

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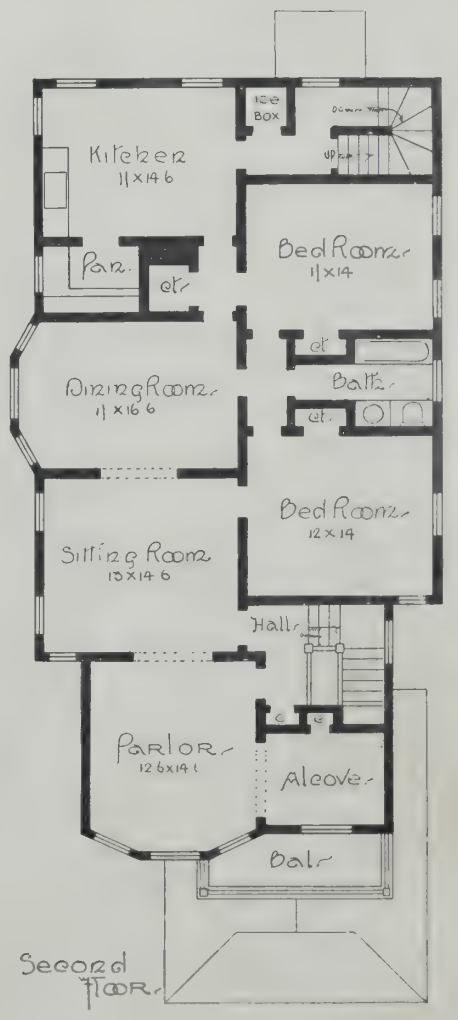

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A TWO-FAMILY HOUSE AT NEW HAVEN, CONN.—See page 17.

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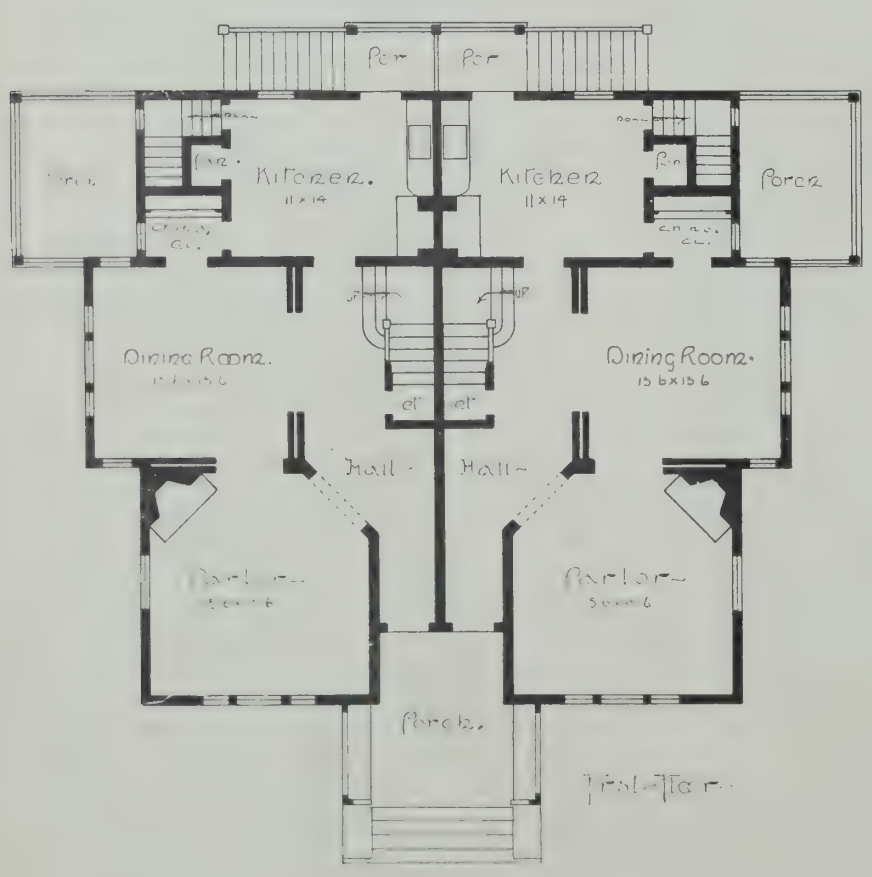

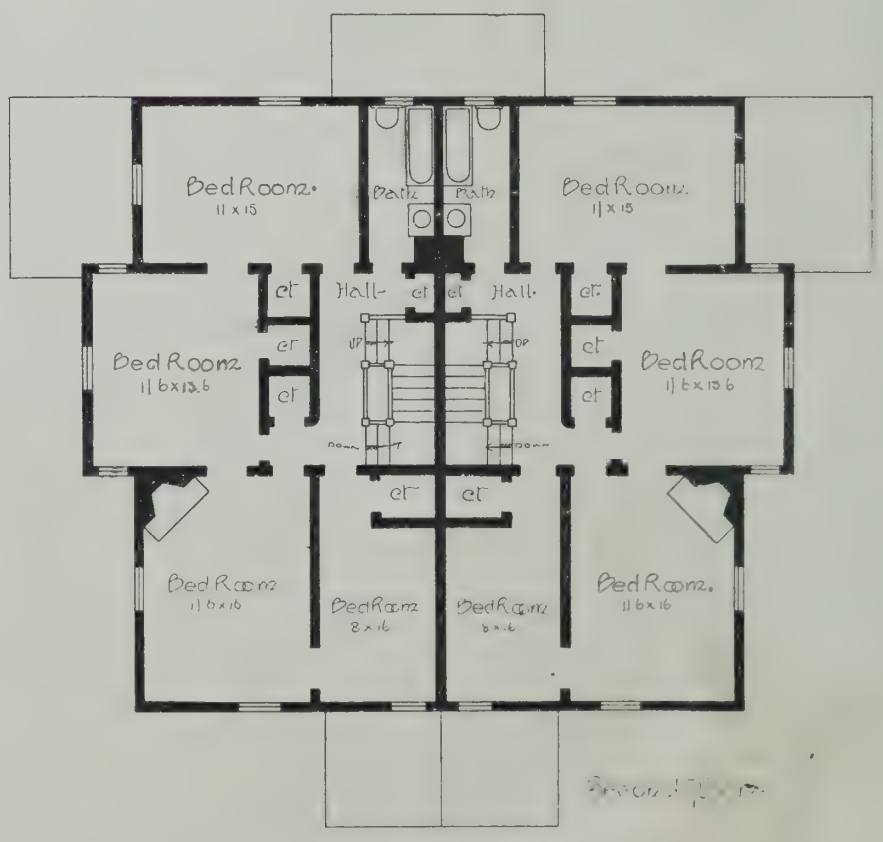

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A MODEL DOUBLE DWELLING AT NEWARK, N. J.—See page 3.

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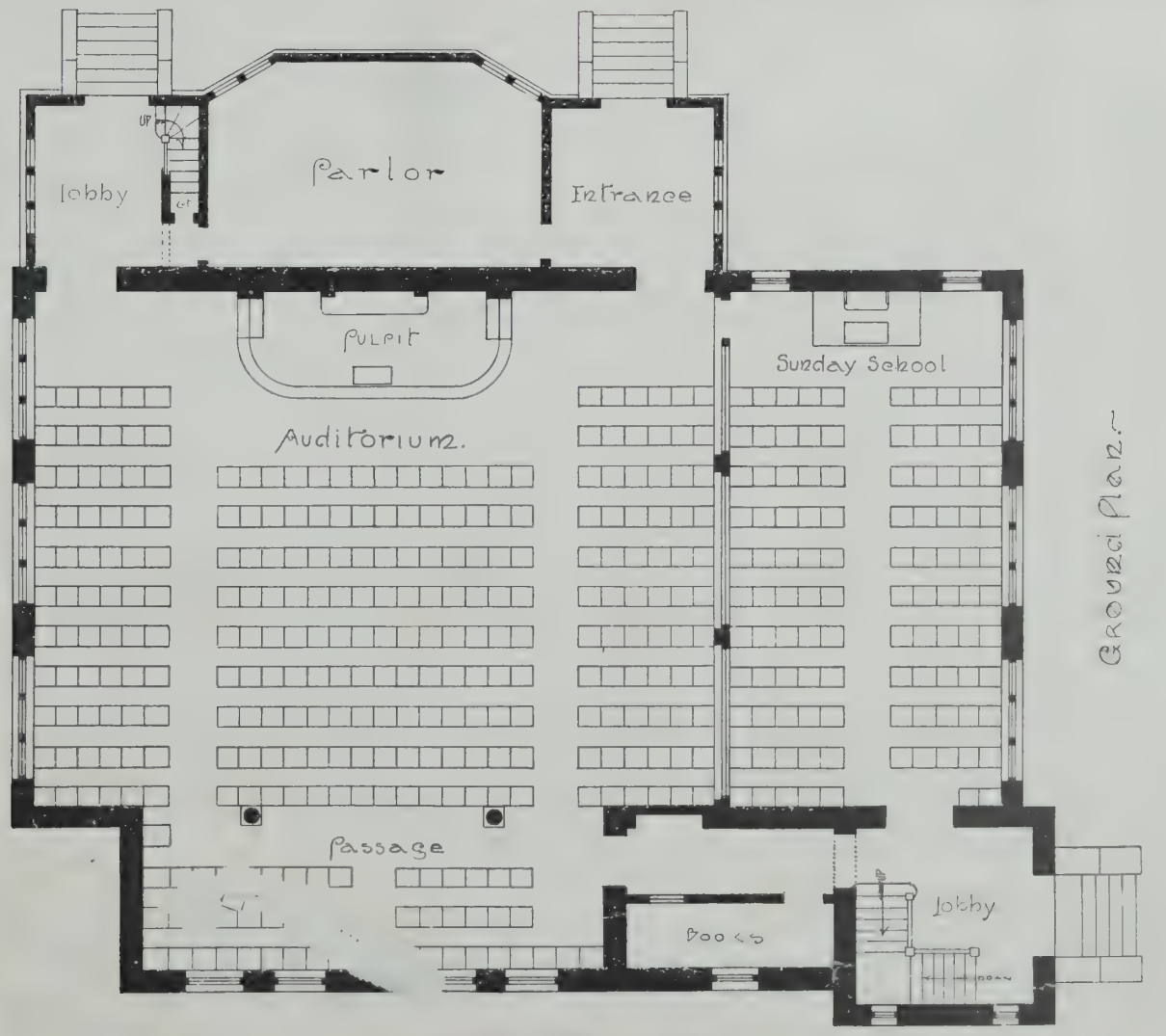

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THE FIRST M. E. CHURCH, BAYONNE CITY, N. J.—See page 17.

ST. LUKE'S HOSPITAL.

We present herewith, on pages 1, 8 and 9, illustrations showing the exterior and interior views, together with plans of first and second floors, this being sufficient to give an idea of the arrangement of the other floors, which are similar, of the new building of St. Luke's Hospital, at Morningside Heights.

We cannot pass on, however, to a description of the buildings in particular without giving a brief review of the origin of what is now the most magnificent hospital building in the world, with the exception of one instance.

St. Luke's Hospital represents the earliest effort of the Episcopal Church to provide a general hospital for the sick poor, without distinction of race or creed. The thought was conceived by the Rev. William Augustus Muhlenberg, D.D., while rector of the Church of the Holy Communion, and it was first expressed in an address to his congregation, on St. Luke's day, 1846, in which he named his ideal hospital "St. Luke's," for "the beloved physician," and devoted one-half the offertory, the sum of $15, toward its erection. The spirit of the man was shown when he replied to a question asked him that day: "Doctor, when do you expect your hospital to be built?" "Never! unless I begin." He was soon encouraged by a gift of $1,000, and other gifts of a similar character soon followed. The hospital was incorporated in 1850, and, while searching for a site, the managers, learning of the earnest but unsuccessful efforts of the Free Anglo-American Church of St. George the Martyr to establish a hospital for British emigrants, made arrangements satisfactory to all concerned, and the latter was merged in the movement which founded St. Luke's. The corner-stone of St. Luke's Hospital was laid by Bishop Wainwright, May 6, 1854. On Ascension Day, 1857, the hospital chapel was opened with appropriate services, the sermon being preached by the rector of St. Bartholomew's Church, the Rev. Samuel Cooke, D.D. During the summer of 1859, the institution became the abode of the Rev. Dr. Muhlenberg, and, until his death, April 8, 1877, he resided there, and, as pastor and superintendent, gave direction to the administration of the hospital. He was a man of clear convictions, and he believed that the hospital, in all its departments, should practically manifest to the patients the Christian charity which was appealed to for its support. His patients were to be treated as "guests of the church," having souls to be saved from sin, as well as bodies to be cured of disease. He adopted as the motto of the hospital, which he impressed upon its corporate seal, the words: "*Corpus sanare; Animam salvare.*"

The doors of the hospital have never been closed to suitable and needy applicants for relief; the chapel and ward services are daily held, while business honor has been maintained by carefully selected officers and boards of management. The building on the corner of Fifth Avenue and Fifty-fourth Street proving inadequate to accommodate the growing work, it was decided to look for a site and erect new buildings. On February 19, 1892, a new site was purchased, between Morningside and Amsterdam avenues, and 113th and 114th streets, and opposite the site of the Cathedral of St. John the Divine

The new buildings have been erected from designs and under the superintendence of Mr. Ernest Flagg, architect, 54 Broad Street, New York. St. Luke's Hospital, if the entire plan is carried out as projected, will consist of nine semi-detached buildings, four on 114th Street, and four on 113th Street, with the administration buildings in the centre, running through from street to street, the principal front being toward 113th Street. One corner of each of the four pavilions nearest the administration building touches a corner of it, and the connection between them is at this juncture, through passages running from the administration building in diagonal directions. Where these passages pass from one building to another there are open arches on each side, this giving fresh air cut-off. The connection between the administration building and the corresponding pavilions on 114th Street are arranged in the same way. These latter are separated from the pavilions by fifty feet. The 114th Street section of the administration building is connected with the front portion by bridge-like constructions at certain floors.

It will be seen from the foregoing there will be free circulation of light and air around every building on each of its four sides; also, that there can be no possibility of the direct circulation of air from one building to another.

Of the nine buildings which will compose the group, when completed, there are but four constructed, leaving the rest to be added in the future, as the needs of the institution require them, and the means are provided. Those that are erected are the two sections of the administration building, or the Muhlenberg Pavilion; the Minturn Pavilion, to the east, on 113th Street, and the Norrie Pavilion, to the west, and the Vanderbilt Pavilion, or nurses' home, on 114th Street, to the west. The buildings are carried out in the Renaissance style of the modern French school. The general appearance of the buildings and the whole scheme are somewhat similar to those of the Luxembourg, at Paris. The basement is constructed of granite. Above this, the first story is built of white marble, and the remainder is constructed with buff brick, with white marble trimmings. The roofs are covered with red tiling. The whole color effect is most excellent. In the centre of the south façade of the administration building, and projecting somewhat into the court, stands the tower, dominating the whole group, and indicating the location of the chapel behind it. It measures 180 ft. from the level of the curb to the top of the cross. In the base of the tower is the main entrance, preceded by a porch and porte-cochère. At the angles of the tower are bold buttresses, crowned by canopies, on each of which stands a statue representing one of the Four Evangelists. The central part of the tower rises higher, and is in the form of a domed octagon, supporting a lantern.

Upon entering the administration building, the first object to strike the eye is the chancel end of the chapel, directly in front of you, and nearly 150 feet distant. After passing the outer vestibule, one finds himself in a large entrance hall, measuring about 30 to 70 ft., near the end of which is a broad flight of steps, leading to the chapel, which is raised six feet above the hall, from which it is separated by a screen of plate glass. The interior, while visible from the hall, will, from the elevation of its floor, appear sufficiently removed from the ordinary traffic of the hallway to be in keeping with its sacred character. This beautiful vista will not only be a striking feature in itself, but one calculated to impress all with the religious character of the institution. This hallway, of which we present a view, is traversed by a corridor, running through the building from east to west, connecting the main staircases and elevators, and a similar corridor is repeated on every floor. It is lighted at each end by five windows, which follow the rise of the stairs, partly contained in semicircular projections, which appear as turrets on the exterior. The elevators are large, so as to admit stretchers and wheel chairs for the sick. At the staircases, both at the east and west, the main corridor branches off in diagonal directions to the outlying pavilions. The ground floor of the administration building is devoted to offices, reception rooms, and the Managers' Board Room, which is a stately apartment, very handsomely treated in the Renaissance style, and containing portraits of the various benefactors of St. Luke's. On the first three floors above are the children's wards, occupying, with their dependencies, the whole southern portion of the administration building. The wards proper occupy the tower; the dependencies, consisting of a nurses' room, gruel room, poultice room, dining-room, pantry, and bathroom, for each ward, are at either side. In the northern portion of the building, on the second floor, are placed the hospital library and the doctors' general office. Over these are bedrooms for the house staff. The fourth floor contains the doctors' and officers' dining-rooms. The whole of the fifth floor is devoted to the operating-rooms and dependencies. The main operating-room and amphitheatre occupies the tower, and it has a high domed ceiling, supported by columns, and is of a commanding appearance. Connecting with it is a visitors' waiting and cloak room. There are, also, a septic and a private operating-room. All the operating-rooms are provided with the necessary etherizing, instrument and nurses' rooms. There are, also, a small ward and several private rooms for the treatment of severe cases after operation; rooms for the sterilizing of dressings, the keeping of bandages for pathological examinations, and for photography, are also provided; also, toilet rooms and lavatories. The chapel building, which is at the rear of the administration building, and which we have already mentioned, contains the chapel, of which we present an interior view. It is 70 ft. long, 30 ft. wide, and 34 ft. high. The entire end opposite entrance is occupied by the altar, reredos, and great window, the latter a memorial gift from Mr. Gordon Norrie, in memory of Mr. Gordon A. Norrie and Dr. Muhlenberg. The chancel is raised two steps, and the altar is five steps above the general level. The altar and reredos are built of white marble, and the floors are laid with similar marble. The walls have paneled wainscoting to a height of five feet, above which are groups of five memorial panels, separated by broad pilasters rising to ceiling, and furnishing a vaulted effect, from the centre of which are suspended massive chandeliers of exquisite design. At the right of altar is an entrance to lobby and staircase to first story and main entrance on 114th Street. On this floor is the receiving-room, the store for kitchen supplies, an office and bedroom for the steward, various bedrooms for orderlies, and a lecture room for doctors and nurses. The basement of this building contains boiler room, machine room, carpenter shop, room for dynamos, pump room, garbage burning room, etc.

The second story contains suites of apartments for the chaplain and assistant pastor and superintendent. On the third, fourth and fifth floors are doctors' and clerks' rooms. On the latter floor is a large sitting-room for the attending staff, and also the medical library. The kitchen department has been placed on the sixth floor of this pavilion. It has a separate staircase and elevator, connecting with the steward's office on the floor. Attached to the kitchen is a bakery, small kitchen for the training of nurses, store room, refrigerator room, sculleries, etc. Food is sent to the patients of the various wards, in warming cans, by means of small cars, with rubber wheels, which are raised from one floor to another by an elevator provided for the purpose. On the first floor above the kitchen are the servants' dining and sewing rooms. The greatest amount of consideration has been given to the ward pavilions, because they are the most important part of the institution. Upon the proper location, lighting and ventilating of the wards depends the success or failure of a plan. The requisites of a ward are that it must have light on three sides; it must have sun on three sides during some portion of the day; it must be located with respect to other portions of the structure, and surrounding structures, in such a way that sun can freely enter the windows on all three sides; it must have the greatest amount of southern exposure; it must have natural cross-ventilation from east to west; there must be a complete circulation of air around it and its dependencies at all times; there must be no possibility of the direct circulating of air from it to any other ward. In addition to this, certain groups of wards must be so arranged as to be cut off and completely isolated from the rest of the establishment, when necessary, and the ward pavilions must be placed with respect to themselves and to the administrative portion so as to admit of convenient and economical administration. Economy of administration is generally sacrificed to attain the other requisites. The expedient of widely separating the wards is resorted to, instead of the more difficult way of reaching the same result by an ingenious arrangement of the parts. These requisites having been laid down as a basis, the establishment was planned to conform therewith, and does so conform in all respects.

Each ward contains twenty-four beds, and it occupies the southern half of the floor, with the dependencies on the northern. Each ward has an anteroom; a nurses' room, with a window, from which can be seen the whole interior of the ward; bathrooms, lavatories, and closets, within easy access from the ward, without crossing corridors, the closets being located in a small turret, so that they are entirely outside of the building proper, and subject to a cross-current of air, and have, also, artificial exhaust ventilation, independent of that provided for the ward. Back of the ward runs a corridor, with windows at both ends, separating it from the other ward dependencies, which consist of a dining-room, pantry, a small kitchen for special cooking, small ward of two beds for special cases, a quiet room for delirious patients, reception room, and all the necessary apartments. The ward pavilions contain no stairs or elevators, but they are in close communication with each.

The Minturn Pavilion contains sleeping rooms in the basement for men servants. The Norrie Pavilion contains the outside patients' dispensary. It has a large waiting-room, four general examining-rooms, gynæcological examining-room, operating-room for slight cases, special rooms for the treatment of eye, ear and throat cases, rooms for medicated air, and the general drug room of the hospital. The isolating wards are located in the roofs of both the Minturn and Norrie pavilions, and also the chapel pavilion. These can be reached only from the flat roof on the front administration building. The isolating ward for men is in the top of the Norrie Pavilion, that for women in the top of the Minturn Pavilion, and the children's isolating ward is in the top of the chapel pavilion. Each of these is divided into small wards, private rooms, nurses' room, small kitchen, etc. By this location of the wards, they will be more completely cut off from the rest of the establishment than by any other possible arrangement, and, at the same time, be within easy access for the doctors or nurses. The Vanderbilt Pavilion, containing the nurses' home, is directly back of the Norrie Pavilion, to which it corresponds in size, but not in the number of stories.

On the ground floor are the parlors, reception room, dining-room and pantry, head nurses' and matrons' bedrooms, sitting-rooms, and lavatories. The second, third, fourth, fifth and sixth stories each contain twenty separate bedrooms for nurses, or one hundred in all. On each floor are four bathrooms, with the usual lavatories, etc. The building is provided with a separate staircase and elevator, and there are means of connecting each floor with the administration building. On the seventh floor there are accommodations for forty female servants. Access to this floor is by the administration building. The eighth floor contains a solarium for female patients.

The basement of this pavilion contains the laundry, sterilizing and disinfecting rooms.

There is a special elevator provided for soiled linen, which will be collected from the wards in galvanized iron receptacles, or cars, similar to those used in carrying food. These are sent by the elevator direct to the soiled linen room, in basement. The morgue, autopsy and pathological laboratory are located in a small building to the west of the main administration building, from which it can be reached by two covered passages, supported on posts, and running from the level of first floor, and from the first landing of the westerly staircase.

A small building, east of the administration building, contains the ambulance stable, apartments for the ambulance drivers, stablemen, and hay and feed loft. The inside finish is plain in its treatment. No mouldings, cornices, or ornaments of any kind, which can collect dust, are used in the parts occupied by the sick. All

cornices, whether at the ceilings, sides, or floors, are rounded, so that they can be easily kept clean. The walls and ceilings are of a non-absorbent substance, and the floors are of wood, laid directly on the concrete, with the pores and cracks filled with paraffine, melted in with a hot iron, so as to make them non-absorbent. There is very little wood used, with the exception of doors, floors, and linen closets. The finish around the windows is of glazed brick. The doors have panels set flush with the styles. The woodwork throughout is of oak.

From the foregoing, it will be seen that the architect, Mr. Flagg, has given the question of natural ventilation the greatest possible care, as indicated by the plans, and the arrangements of the various pavilions to each other. This is the most vital point in the planning of a hospital. During a greater part of the year the windows can be opened, and thus the best kind of ventilation secured. In cold weather, the difference in temperature between the internal and external air is such that the problem of artificial ventilation becomes easy. At such times, it will be merely necessary to open the inlets to the great ventilating flues, and the building will ventilate itself. Care has been taken to provide such ventilation, of the most approved kind, both by exhaust and propulsion. All the air admitted is drawn from the top of the building, the propelling fans being located at the bottom of the great air shafts which occupy the centre of each pavilion. The system of artificial ventilation is sufficient to change the air of all the structures once in every ten minutes. Fresh air, warmed or not, as desired, can be admitted under the bed of every patient, and the vitiated air will be drawn through apertures in the ceilings of the wards. All the buildings are as thoroughly fireproof as it is possible to build them.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

RESIDENCE OF LEON DESSEZ, ESQ., WASHINGTON, D. C.

We present on page 11 the residence of Leon Dessez, Esq., at Chevy Chase, Md., a suburb of Washington, D. C. The design is broadly treated, underpinning being of local stone, exterior framework above sheathed, and covered in front with wide boards, giving appearance of stone courses; rear portion clapboarded; painted white. Second story of front portion pebble dash plastered, and tinted yellow. Porch and porte-cochère piers, as well as chimneys, are of gray brick, with white mortar joints, the latter having ornamental terra-cotta caps. Roofs shingled, and stained red. Trimming color, white; blinds, green. Dimensions: Front, 46 ft. 8 in.; side, 48 ft. 8 in., exclusive of porch, terrace, or porte-cochère projections. Heights: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; attic, unfinished. Reception hall, dining and living rooms, plastered, sand float finish, and separated only by flat arched openings, supported by Tuscan columns. The wide angle fireplace in living room is faced with mottled yellow brick; two Tuscan columns to ceiling; three shelves, with paneling between, form mantel above; stone hearth. Dining-room fireplace, also faced with brick, same as other, has paneled back, and mirror above. Recessed buffet, with drawers under, adjoins corner china closet. Wide staircase, of easy rise, has square oak newel and slender turned balusters on straight string; face of stairs paneled. Pantry is means of communication with kitchen, laundry, etc., in rear. Second floor plan shows six chambers, two being for servants, and bathroom, with enameled tub. Other fixtures of good make. All plumbing exposed. General finish throughout, white pine, painted. Attic, unfinished. Cellar, cemented, contains steam heater, fuel storage, etc. Approximate cost, $7,500. Lindley Johnson, Esq., architect, 1524 Chestnut Street, Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT NYACK, N. Y.

We present to our readers in this issue, on page 6, a residence recently erected for B. J. Frost, Esq., at Nyack, N. Y. The design is of the modern Colonial treatment, with lines well broken by spacious piazza, porte-cochère, bay windows and tower. The foundation and posts at porte-cochère are built of rock-faced stone laid up roughly in white mortar. The first story, exterior, is covered with clapboards and painted olive yellow, with white trimmings. Balustrade at piazza. Second and third stories are shingled and left to finish natural. The roof is also shingled and treated in a similar manner. Dimensions: Front, 47 ft.; side, 28 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. The hall is finished in an attractive manner. It is trimmed with oak, and contains a staircase of oak and an open fireplace built of brick, with tiled-brick facings and hearth, and a massive oak mantel and wrought-iron trimmings. This floor, and throughout, are laid with yellow pine and polished. Parlor is treated with white enamel in a dainty manner. Library is trimmed with oak, and it has an open fireplace trimmed with tiles, and an artistic mantel. Dining-room, trimmed with similar wood, contains a bay window with a cluster of small windows, and a china cabinet built in with leaded-glass doors. Butler's closet is fitted up in the best possible manner with drawers, shelves and bowl. Kitchen is wainscoted and furnished with the usual fixtures. The second floor is trimmed with North Carolina pine and then treated in colors. This floor contains five bedrooms, large closets and bathroom, the latter being wainscoted and fitted up with exposed plumbing. Third floor contains two bedrooms and ample storage. Cemented cellar contains furnace, laundry and other apartments. Mr. Marshall L. Emery, architect, 74 Bible House, New York.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A TWO-FAMILY HOUSE AT NEW HAVEN, CONN.

We present herewith in this issue, on page 13, a two-family house, which has been erected for Dr. F. W. Brown, at New Haven, Conn. The house is arranged for two families, one on each floor, and each apartment containing six rooms, besides pantries, closets and bathrooms. This plan, with its good elevations, makes a most excellent design for a house of this character. The foundation is built of stone, and the underpinning of buff brick. The superstructure of wood is clapboarded and painted a light gray color, with darker trimmings. The roof is slated. Dimensions: Front, 32 ft.; side, 58 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 9 ft.; third, 8 ft. The feature of the front entrance is that the doors are treated so as to resemble a private residence. The principal rooms are trimmed with brown birch. The halls and dining-rooms have hardwood floors. The front hall on first floor has a good feature in its pleasant nook and bay window thrown out at first landing. The parlors and sitting-rooms are separated by archways, the former having mantels of hardwood and of neat design. The dining-rooms have octagonal projections, and are conveniently connected to kitchen. The kitchen, pantries and rear hall are wainscoted with narrow-beaded stuff, and the walls and ceilings are painted in oil. The bedrooms are provided with closets, and they are so arranged as to be in direct communication with bathrooms. These bathrooms have wainscotings, painted walls and ceilings, porcelain fixtures and the best nickelplated exposed plumbing. There are three bedrooms on third floor and ample storage. Cemented cellar contains laundry, separate cellars for each tenant, and hot-water heaters for each floor. The house is provided with electric lighting and electric bells. Cost $6,200 complete. Messrs. Brown & Von Beren, architects, No. 70 Church Street, New Haven, Conn.

Our engravings were made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT SOUTH ORANGE, N. J.

One of the most unique, picturesque and attractive residences at South Orange, N. J., is the one shown in the illustrations presented on page 7, and recently completed for M. W. Ferris, Esq. The design is treated in the modern style with Colonial detail, and it presents many excellent features, both in the elevations and the interior arrangement. The site, being on an incline, gave excellent opportunities for the architects to use their talents in developing a building suitable to the location, and thereby providing an extra story at the rear side of the house, while the front retains the regulation two-story and attic. The underpinning, and all stonework, where shown, are built of huge bowlders with rock faces, and laid up at random. The first story is covered with stucco-work put on and left with a rough surface and natural finish. The second story is shingled and then stained a dark brown mahogany color, while the trimmings throughout are painted yellow white. Roof, shingled and finished natural. Dimensions: Front, 79 ft.; side, 40 ft., not including piazza. Height of ceilings: Cellar, 8 ft; first story, 9 ft. 3 in.; second, 8 ft. 9 in.; third, 8 ft. 1 in. The plans are most excellent, providing very large rooms that are well connected, ventilated and finished. A good feature on the first story is the windows, which have transoms, glazed with stained glass, and shedding a soft and pleasant light over the various apartments. The interior throughout is trimmed with white pine and finished natural. The doors and windows have massive moulded casings. Lobby entrance is provided with large doors of cherry, glazed with stained glass. Hall is provided with a paneled wainscoting and ceiling-beams. It contains a nook with seats, and also a staircase with broad, low treads and colonnade effect. This staircase has a newel, formed of a cluster of spindle balusters, and a mahogany rail. Parlor is treated in white and gold, and is provided with a bay window with seat. Library is provided with bookcases built in, and a massive open fireplace trimmed with tiles and brick, wrought-iron fixtures and a mantel with columns extending to ceiling and elegantly carved. The ceiling is heavily beamed. Den is ceiled up with beaded stuff with [illegible]ed effect, and it has bookshelves and paneled divans built in. Dining-room is provided with a paneled wainscoting, china cabinets built in and inclosed with leaded glass doors, and an open fireplace with tiled hearth and facings and mantel with mirror. Kitchen and pantries are well located and fitted up in the best possible manner with the latest improvements. The second floor contains five bedrooms, ten closets and two bathrooms. The fireplaces where shown are fitted up in a neat manner. The bathrooms are wainscoted and furnished with the best fixtures and exposed plumbing. Third floor contains a large hall, three bedrooms, bath and trunk rooms. The cellar contains an open staircase to driveway, billiard room, laundry, furnace and other necessary apartments. Messrs. Rossiter & Wright, architects, 94 Liberty Street, New York, N. Y.

Our engravings were made direct from photographs of the building, taken especially for the SCIENTIFIC AMERICAN.

THE FIRST M. E. CHURCH, BAYONNE CITY, N. J.

We publish herewith on page 15, in this issue, the First Methodist Episcopal Church, recently erected at Bayonne City, N. J. The illustration presents a design with a good substantial appearance, and it is so arranged that in the future, when the church is enlarged according to its requirements, the part shown in the illustration can be utilized as a chapel in connection with the church proper. The underpinning is built of bluestone with faces left rough as they came from the quarry; the superstructure is built of buff brick and sandstone trimmings. The roof is covered with slates. The plans show an auditorium 50 x 50 ft., Sunday-school room 20 x 38 ft. and parlor 15 x 25 ft., with entrances thereto. The interior throughout is trimmed with ash, and the furniture, pulpit and other fixtures are turned out of similar wood. The various apartments are wainscoted to a height of four feet with narrow-beaded stuff. The auditorium has a seating capacity of six hundred, and the Sunday-school room one hundred and ten. Stairs at front entrance lead to classrooms over Sunday-school and to balcony. The stairway at side entrance leads to organ and choir loft, which is raised and placed back of pulpit. The schoolroom and classrooms over can be thrown into auditorium by simply raising the windows, which slide out of sight at side. The parlor is well lighted and conveniently located, as well as the book closet at main entrance. The cellar contains the heating apparatus, toilet rooms and other necessary apartments. Cost $15,500 complete. Mr. William B. Tuthill, architect, Fourth Avenue and Twenty-second Street, New York.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

Brick Efflorescence.

This unsightly attribute of many brick walls appears to have no real remedy. Muriatic acid will remove it, but the cause remains. Paint won't hold it back. The Standard Oil Company spent hundreds of dollars with paint trying to stop efflorescence on their large building in New York City, but without avail. It is said that the salts will work out of the bricks in five years, but there appears to be no proof of this. Dampness is an exciting cause, as efflorescence seldom, if ever, appears on dry, warmly situated walls. Northerly and easterly exposures are bad. It has been recommended to heat the surface with a gasoline burner, says A. A. Kelly, and then apply hot paraffine. This is a good plan, but the trouble is the expense and difficulty involved.

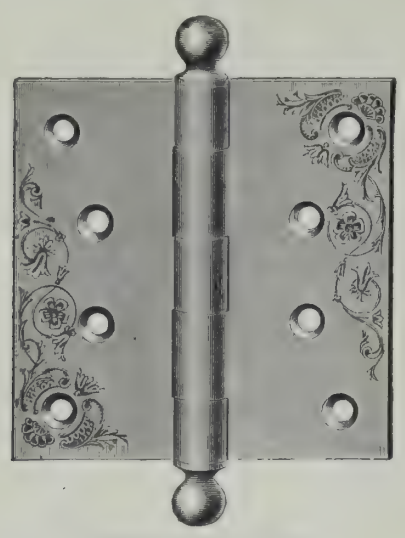
Usually, efflorescence appears near the foundation walls, or under window sills, while other parts are entirely free from the evil. This shows that water is at the bottom of the trouble. The rain, doubtless, gets into the walls at such places, and works its way out, carrying saltpetre, etc., with it.

A Chicago firm of brickmakers is said to have offered $10,000 for a remedy for brick efflorescence. The cure will lie in the preparation of the clay. Somebody says that this cure may be found in the adding of precipitated chloride of barium to the clay, or to the mortar used in laying the wall. A master painter has advised the use of coal oil on the surface of a brick wall. It will darken the bricks somewhat, but will not deface them. Apply it liberally, he says, and it will soak in and neutralize the salts. But it is a doubtful cure. It has failed in New England, as has also linseed oil. There is considerable salt in the brick clay taken from near the seacoasts, and sand used in mortar and taken from the seashore is full of it. Professor Leffman attributes efflorescence to sulphur from smoke being carried into the bricks on wet days. In some parts of the country brick efflorescence is unknown. In Peoria, Ill., for instance, it is not seen, though it is prevalent in Cincinnati.

Bricks should be well soaked before being laid. This will dissolve most of the salts. A new brick has been put into cold water, and the lime it contained cracked it open, and caused the water to increase five degrees in temperature. Efflorescence is worse now, since coal is used in the burning, than years ago, when wood was employed. Analyses of efflorescence show magnesia or epsom salts, sulphate of lime and sulphate of soda. In conclusion, it may be said that efflorescence may be prevented, but not cured. Secure bricks that are made away from the seaboard parts; soak them before laying, make all joinings around windows, roofs, etc., tight, and avoid dampness from the foundation walls.—*Iron Age.*

A NEW STANLEY BUTT.

The illustration represents a new butt just being put on the market by the Stanley Works, New Britain, Conn., and 79 Chambers Street, New York. It is a wrought steel loose pin butt, with ball tips and raised ornamentation, which is made still more prominent by the shading



A NEW STANLEY BUTT.

of the finish. It is a very handsome butt, and to say that it is in every respect of the most excellent manufacture is almost superfluous, as this is so well known a characteristic of the goods turned out at the Stanley Works.

A New Flooring Material.

The name of papyrolith is given to a novelty in flooring material which has lately been invented by Otto Kraner, of Chemnitz, the article being a special preparation of paper pulp, which is in the form of a dry powder; when mixed with water it may be spread like mortar over stone, cement, or wood, where it dries quickly, and may be smoothly planed, besides which it may be tinted almost any color, in this way adapting it for parquetry with variegated borders, or for panels and mosaics. Among the various advantages claimed by the inventor for the use of this product are freedom from crevices, deadening of noises, and poor conduction of heat, also considerable elasticity, safety from fire, and remarkable durability. It may be employed, too, for wainscoting and other architectural purposes, as well as for flooring.

Paint Manufacturers as Contractors.

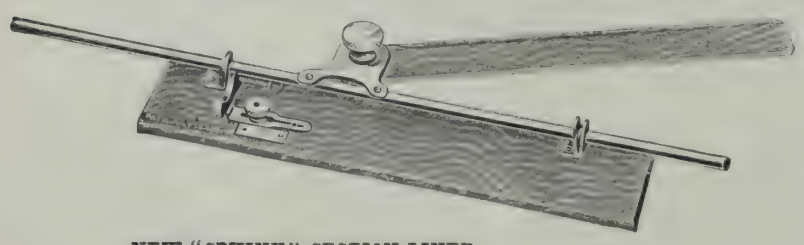
Messrs. Billings, King & Co., paint and varnish manufacturers, of New York, have recently issued a circular to architects, in which they say: "Our products are high priced, and hence are difficult to introduce through the ordinary channels of the metropolitan house painter, and because of this experience we have decided to enter the arena of competition for work on all contracts in the cities of New York, Brooklyn, Boston and Philadelphia, the value of which would aggregate $1,000 or over, with the confidence that our financial responsibility as well as our knowledge of the manufacture of paints and varnish would entitle us to an opportunity to estimate on all first class work." For the paint manufacturer, in this way, to do business more directly with the builder or owner cannot fail to insure better results, and the announcement deserves the attention of the architects generally.

Large Ventilators.

N. & G. Taylor Company, Philadelphia, Pa., as manufacturers' agents for the Pancoast Ventilator, issue a striking circular, showing a half-tone picture of a 66-inch Pancoast Ventilator, 11 feet in diameter, which, with one of 84 inches, weighing over 1,000 pounds and nearly 14 feet in diameter, was lately sold to the Crittenden Manufacturing & Roofing Company, of Minneapolis, Minn.

NEW DRAUGHTSMAN'S TOOL.

The section-liner shown in the illustration is designed to be extremely useful to the draughtsman, being a very simple construction, and adapted for a great range of work, the guage facilitating rapid adjustment at any angle without changing position. It retains its place on the board by means of pins in the bottom of the base, and without the aid of T-square, straight-edge, hands or weights. It is also well adapted to the needs of pupils in mechanical and architectural drawing classes. It is made

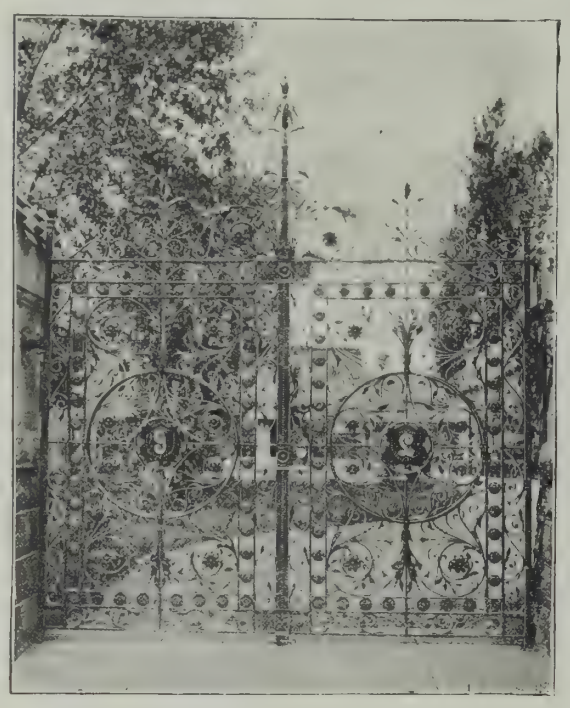


NEW "SPHINX" SECTION LINER.

by T. Weber & Co., manufacturers and importers of artists' materials, 1125 Chestnut Street, Philadelphia, Pa.

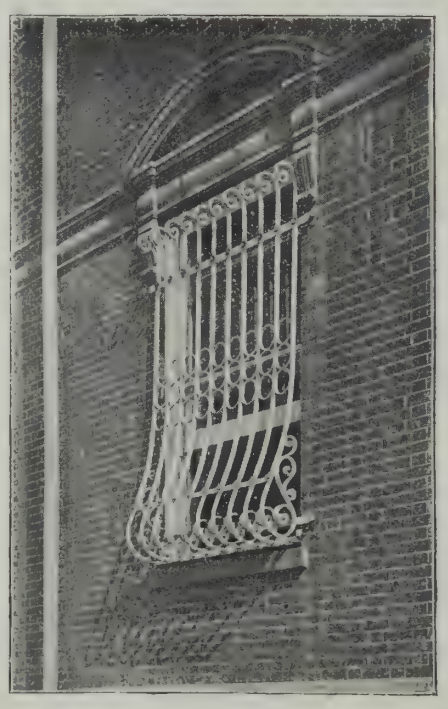
ORNAMENTAL IRON WORK.

The accompanying illustrations are from photographs of samples of artistic and plain work recently manufactured by the well-known firm of William F. Remppis & Co., Reading, Pa. Their line of manufacture comprises everything pertaining to builders' iron work, anchors of every description and for all purposes, stirrups, stairways, iron railings, from the most artistic designs to those of the plainest description, fire escapes, table fixtures, area gratings, elevator inclosures, etc. The firm have, in course of preparation, a catalogue illustrating and describing a



ORNAMENTAL WROUGHT IRON GATE.

wide variety of artistic, ornamental and staple work of this character, designed and manufactured by them, but its issue has been delayed by a fire in their establishment, in May last, by which nearly all of the engravings were destroyed. This catalogue is now nearly ready for publication, and the company have erected and are at work in a new plant, replacing the one destroyed by fire, and



WROUGHT IRON OPEN WORK GRILL.

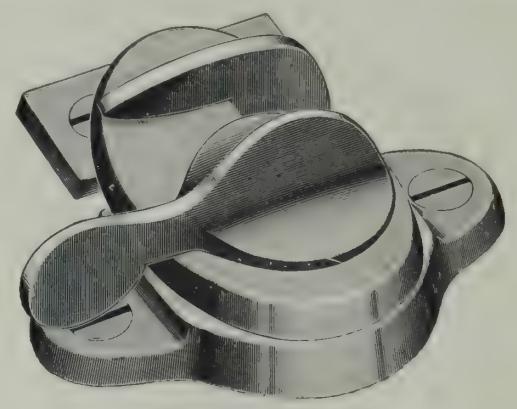
fully equipped with the latest improved machines. Their workmen include some of the best skilled artisans in their line, and the firm have on hand upward of $40,000 worth of contracts, to be completed within the next six months, for new buildings in Philadelphia, and other cities.

THE SCIENTIFIC AMERICAN Patent Agency has just issued its new hand-book on patents, which will be sent to any one contemplating the securing of patents free of charge. This little book is up to date, and gives valuable information concerning the steps necessary for procuring patents, trade marks, etc.

ONE of the best and quickest ways of cleaning the isinglass windows in a stove is with vinegar and water. Dip a soft cloth in the vinegar and water, and quickly rub the windows over, going well into the corners. The windows will remain clean for a long time.

A STAMPED METAL SASH LOCK.

The sash lock shown in the illustration is one of the most simple and easy working, and at the same time one of the most strong and durable, of any of the numerous



THE IVES SASH LOCK.

devices which have been brought forward in this line. It is made in cold rolled steel, bronze, and brass, in all the popular finishes, by Hobart B. Ives & Co., New Haven, Conn.

A Floor of Great Solidity.

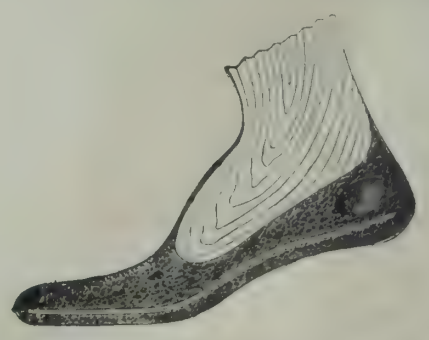
In the Edison Illuminating Company's new station at Paterson, N. J., the floor was made of granilite, the construction being in accordance with the patented method of the Ransome & Smith Company, of Chicago. The floor and building are calculated to accommodate twenty 600-horse power engines, and three engines of 1200-horse power each, there being also forty-five generators setting on the floor, a heavy iron switchboard, and other accessories of great weight. The floor is 93 x 20.8 ft. in the engine and dynamo room; it was calculated to carry twenty tons of concentrated load, and in testing it when forty-five days old it was loaded to double this weight. The building is a fine example of very solid, fire-proof construction.

THE Cincinnati Corrugating Company, Piqua, Ohio, since the recent election report an appreciable impetus in the demand for their productions of steel and iron roofings, corrugated arches, lath, shutters and doors, galvanized iron, etc., and are enjoying a good trade on these goods. They have issued a circular letter relating to the comparative merits of various roofing materials bearing especially, among other features, upon the cheapness of first cost, freedom from repairs, effectiveness, fireproofing qualities and durability of the different roofing materials now upon the market, arranged in tabular form, giving much valuable information upon the subject that should be in the hands of all using or handling roofing of whatsoever kind, which they will be pleased to send free upon request.

THE Pecora Sand Finish Stains of S. Bowen's Sons, Philadelphia, form an extremely neat and beautiful tinting for rough sand finish, pebble dash, kalsomine, lime, or whitewash. They are of superior tone, will not look washed or faded, and make a handsome background for stencil or ornamental work.

A NEW RUBBER FOOT.

An improvement has been made recently in artificial feet. The original rubber foot, with stiff ankle-joints, was a vast improvement over the old style of wooden foot with articulating joints. The rubber reduces the shock and gives an elasticity of movement, while the absence of the ankle-joint removes the old clanking and the uncertainty of movement incident to this mechanism. The new invention consists of the insertion of a mattrass of canvas in which is imbedded side by side a layer of narrow, flat, steel springs. The canvas holds them in the pocket, in which they slide freely, and the ends are capped with metal to prevent their perforating the rubber and leaving their proper bed. The rubber which rests above this mattrass is spongy, containing, therefore, a large percentage of air, increasing the lightness and also the flexibility of the foot. Further, just above the posterior



end of the mattrass in the heel there is a large air chamber so arranged that it cannot burst, and thus preventing the heel from matting or failing in elasticity. By this improvement the foot is also lightened, and now weighs from 8 to 16 ounces less, varying according to the weight of the person wearing the limb. A. A. Marks, 701 Broadway, N. Y., is the sole proprietor of this artificial foot.

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INTERIOR VIEW OF RESIDENCE AT INTERLAKEN, N. J.—See page 34.

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THE

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SCIENTIFIC AMERICAN, BUILDING EDITION.

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CAST-IRON AS A BUILDING MATERIAL.

Of all the metals that enter largely into the arts of construction, it would be difficult to find one that is subject to more severe limitations than cast-iron. These arise from the well known fact that though it possesses a high compressive strength, in tensile strength it ranks very low among the metals. With a crushing strength which varies between thirty and forty tons per square inch, it will rupture under a tension of from six and a half to eight tons per square inch. This disparity is so great that it has caused cast-iron to be regarded with distrust, except for certain classes of work. It is never used where it is subject to tensional strains, except in cases where its bulk may be largely increased without detriment to the structure in which it is placed. It is particularly treacherous in places where it is subject to continued jar and shock, and hence it has long ago been abandoned in bridge-work and such parts of machinery as are subject to sudden bending or torsional strains.

It was inevitable that cast-iron should be used for all classes of construction at a time when wrought-iron was costly and scarce and difficult to work. Engineers attempted to get over the difficulty of the tensional weakness by giving it a proportionate increase of section when necessary. The old cast-iron girders for railroad bridges were made with five or six times as much material in the lower as in the upper chord, so that, theoretically, the strength should be uniform throughout; but the frequent disasters proved that, even with this precaution, the material was unreliable for bridge construction.

In general, it may be said that whenever cast-iron is used in a structure, care should be taken to design it in such forms that it will never be subjected to any but compressive strains. Cast-iron columns for carrying heavy loads should never be cast with hollow mouldings or wide, projecting bases, unless care is taken to greatly thicken the metal at these points. The better way is to cast these ornamental parts separately, and make the section of the column uniform throughout. It is evident that when the shell is splayed out to form a wider base, the metal is at once subject to a tensional strain on its inner side, to resist which it has no adequate thickness. We have quoted this as one point among many which should be carefully kept in mind when designing in a material which is at once so strong and so weak. Another, and more serious, danger arises from the unequal loading of cast-iron columns, a risk to which the outer columns of skeleton construction buildings are particularly liable. A load whose centre of gravity comes directly over the axis of a column will exert an even compressive strain on all parts of the metal; but as the load is shifted to one side, the strain on that side is increased, and on the other side it is correspondingly reduced. When, as in the case of columns cast with side-brackets, the centre of gravity of the load is applied entirely outside the shell of the column, a positive bending effect is set up, the metal of the shell on the opposite side to the bracket being thrown into tension. Now, although this would not probably be of any serious consequence in a column of steel whose tensile strength is high, it might imperil the safety of a cast-iron column whose tensile strength, inch for inch, would be only one-fourth as great.

The action of cast-iron columns under such circumstances was recently tested at the Yorkshire College, Leeds, England, when a full-sized column, with a double-bracketed head, failed under a load which was only one-sixteenth of what it should have carried if the load had been centrally placed. The load was applied at a point on one of the side-brackets seventeen inches from the axis of the column, corresponding to the actual centre of pressure had the load been transmitted from the end of a girder or floor-beam in the usual way. The column broke under a load of 65.5 tons. From the nature of the fracture it could be seen that the failure commenced on the off-side of the column, where the material was thrown into tension. The sectional area at the line of fracture was 34.3 square inches, and the compressive strength, as ascertained from test-pieces cut from the column, was 34.3 tons per square inch, making a total compressive strength of 1,043 tons. As the column failed under a load of 65.5 tons, it will be seen that the eccentric loading reduced the ultimate strength fully sixteen times. The tensile strength shown by pieces cut from the column near the point of fracture, on the off-side from the bracket on which the load was applied, was 8.45 tons. A photograph of the test, which was recently published in *Engineering*, shows that the fracture runs obliquely from a point about fourteen inches below the arm of bracket on the off-side, to a point just under the arm of the opposite bracket on which the load was applied.

There is much food for thought to be found in the results of the test. The column that failed was not an abnormal type, but of the standard pattern that is daily being built into factories, works, and city business blocks. The load is transferred to them by means of side-brackets, and in cases where the loading is uneven, the columns are just that much weaker than they would be if the load were centrally placed. In the case of columns built into exterior walls, the load is necessarily eccentric, and the varying live-load that is put upon columns in interior walls places them at a corresponding disadvantage. This is a fact that should always be borne in mind in determining the dimensions of cast-iron columns, with side-brackets for carrying the loads. The ordinary formulæ for calculating the strength of posts are not applicable in such cases.

A MODERN DWELLING AT BRIDGEPORT, CONN.

We present herewith in this issue, on page 27, a modern dwelling recently erected for Mr. Andrew J. Porter, at Bridgeport, Conn. The design is a pleasing one, with good elevations, showing bay windows, a pleasant piazza, and other features, together with a most conveniently arranged plan, presenting a large reception hall, parlor, dining-room, kitchen on first floor, and three large bedrooms, alcove, closets, and bathroom on second floor, while the third floor contains two bedrooms and ample storage. The underpinning is built of bluestone, with faces left rough as they come from the quarry. The superstructure, built of wood, is covered with clapboards on first story, and shingles on second and third stories. The whole is painted with harmonizing colors. The roof is shingled, and left to weather finish. Dimensions: Front, 34 ft.; side, 36 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Entrance is through a tiled vestibule, with a good-sized reception hall, containing an ornamental ash staircase, rising to second story, which is lighted by stained glass windows, with pleasing effect. The interior is trimmed with cypress. The parlor and dining-room are separated by sliding doors. The latter contains a pleasing nook, with fireplace built of brick, with hearth, facings, and a hardwood mantel of excellent design. The pantry is fitted up with shelves, drawers, and cupboards. Kitchen is wainscoted, and fitted up replete with sink, pantry, and lobby large enough to admit ice-box. The second floor, already mentioned, has a front chamber, with an elliptical arch, separating alcove. The bathroom is wainscoted, and fitted up complete with the usual fixtures, with nickelplated plumbing. The house also contains gas, and a cemented cellar, with stone wash-trays in laundry, and furnace, with pipes to each room. Cost $3,000, complete. Mr. W. P. Banks, architect, Sanford Building, Bridgeport, Conn.

Our engraving was made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT NEWTON CENTRE, MASS.

We present herewith in this issue, on page 24, a cottage recently erected for Alfred Ely Alvord, Esq., at Newton Centre, Mass. The design is a picturesque one of the gambrel roof order, and it has many good features, and a well arranged plan. The underpinning is built of fieldstone, laid up at random. The building above, of wood, is covered on the exterior with shingles and stained sienna, while the trimmings are painted white. The roof is shingled and finished natural. Dimensions: Front, 38 ft.; side, 32 ft. 5 in., not including porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The hall, which is a central apartment, is treated in china white. It contains an ornamental staircase, with spindle balusters and an oak rail, separated from hall proper by an archway with spindle balusters and transom. Parlor is separated by an archway, and is finished in china white. Library is finished in cherry; it has a door leading to rear porch through passage. The dining-room is trimmed with whitewood and finished natural, and it is furnished with a paneled wainscoting, and an open fireplace trimmed with tiled hearth and facings, and a mantel of excellent design. Kitchen and pantries are wainscoted, and fitted up with the usual fixtures complete. The second floor is trimmed with white pine, and treated in china white; it contains four bedrooms, large closets, and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed plumbing. The floors throughout are of yellow pine. The third floor contains billiard room and one bedroom. Cemented cellar contains furnace, laundry, and other necessary apartments. The architect was Mr. Charles A. Isenbeck, 95 Milk Street, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

PATENTS.

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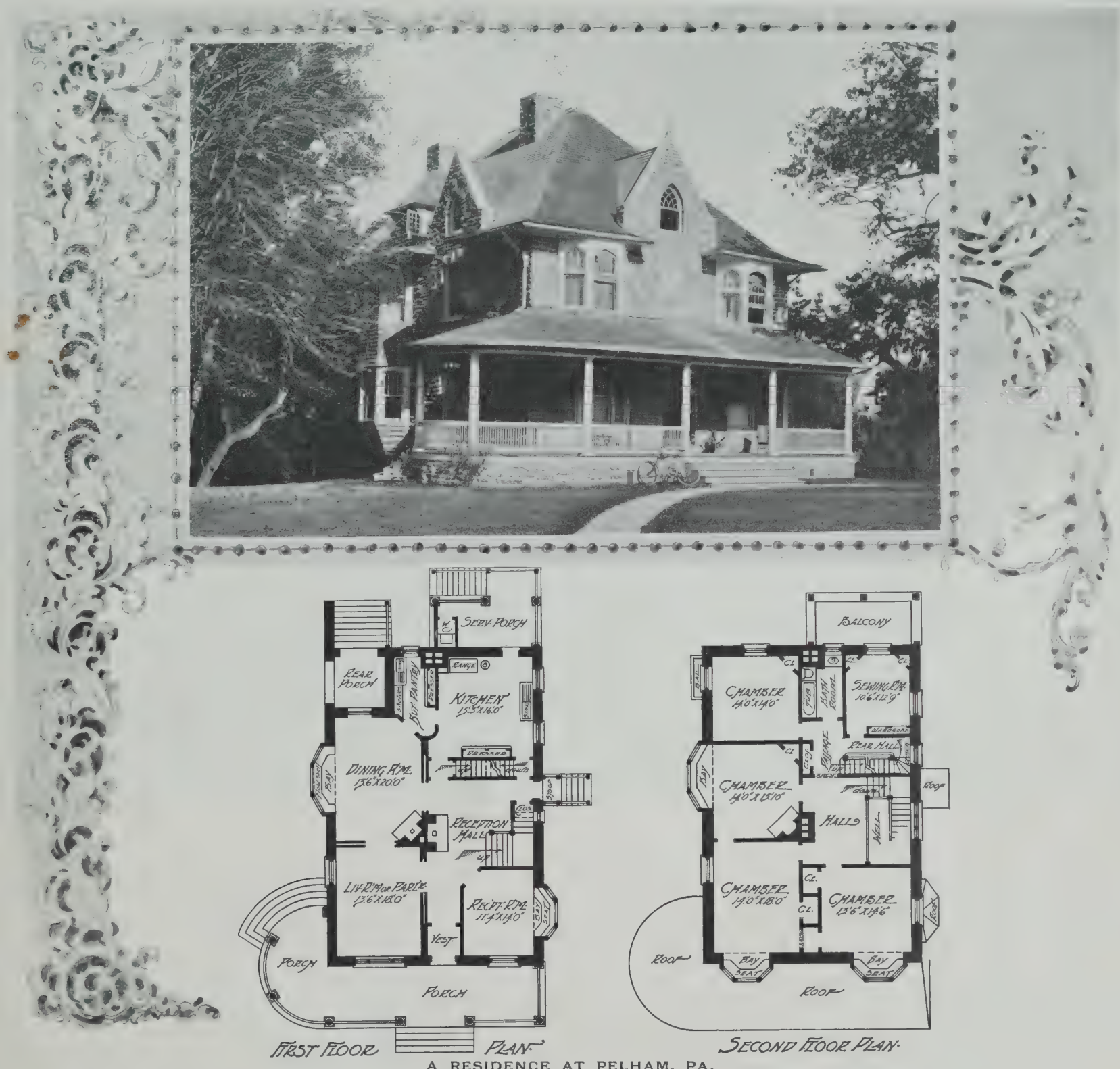
A RESIDENCE AT ENGLEWOOD, N. J.

We present herewith, on page 23, a residence recently completed for Frederick A. Farley, Esq., at Englewood, N. J. The design has many interesting features, although the building is somewhat square-rigged. The porches and bay windows relieve it from the severe treatment and provides it with an artistic finish. The underpinning is built of rock-faced stone, laid up at random and neatly pointed up. The exterior framework is covered with sheathing, paper and clapboarding, laid on in an effective manner, every other row of clapboarding being put on double, thus giving a ribbed effect. This clapboarding is painted colonial yellow, with white trimmings. The frieze is of shingles, and stained sienna. The roof is shingled and painted red. Dimensions: Front, 50 ft; side, 36 ft, exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third 8 ft. The interior plan is most conveniently arranged, and and fitted up with porcelain fixtures and exposed plumbing complete. The third floor contains two bedrooms and ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $7,000, including furnace, and everything complete ready for occupancy. Messrs. Detwiller & Melendy, architects, No. 97 Nassau Street, New York.

Our engravings were made direct from photographs of the building, t ken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT PELHAM, PA.

We present on this page the residence of William T. Gummey, Esq , at Pelham, Pa., a suburb of Philadelphia, adjoining Germantown. The design, though not entirely distinctive, is domestic Gothic in its general treatment; it is reposeful in effect, and extremely appropriate to its surroundings. Underpinning and main structure above of local Chestnut Hill stone, gray in color, laid with



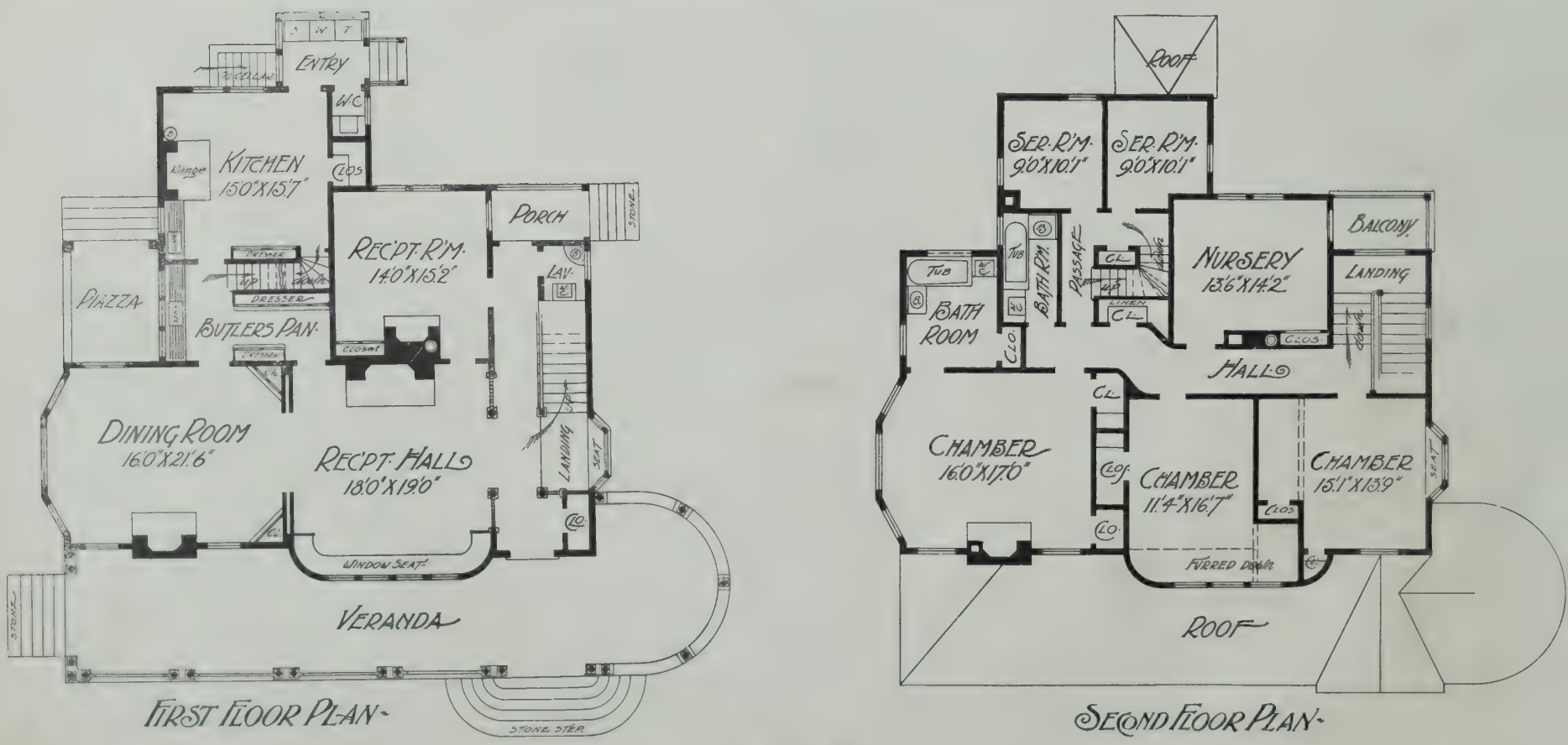
A RESIDENCE AT PELHAM, PA.

it is trimmed throughout with whitewood. The main hall is finished natural, and it contains a vestibule, pleasant nook with seat, and an ornamental staircase turned out of oak. This staircase is separated by an archway supported by the columns of staircase, which is filled in with spindle transom work. The archway between this hall and library is formed of a solid balustrade, under which book-cases are built and carried around both sides of fireplace; from this balustrade, columns rise to ceiling and form an arcaded effect. The library woodwork is finished similar to hall, and it is provided with a bay window, with seat, and a massive brick mantel and fireplace, with facings and hearth of similar brick. The parlor is finished and treated with china white in a dainty manner. The fireplace has tiled hearth and facings, and a mantel of excellent design. The dining-room and the remainder of the apartments are finished natural. This dining-room has an open fireplace of brick. The butler's closet, which is well fitted up with dressers, drawers, cupboards and bowl, connects this room to kitchen; the latter wainscoted with narrow beaded stuff and furnished with the best modern conveniences replete. The second floor contains four large bedrooms, dressing-room, closets and bathroom; the latter being wainscoted with tiles joints well broken; trimmings, heads, sills, etc., of Indiana limestone; bays, dormers and roof shingled and left to weather finish; trimming color, white. Dimensions: Front, 35 ft. 4 in.; side, 52 ft. 2 in., exclusive of porch or bay window projections. Heights: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.: attic, 8 ft. 6 in. The plan throughout is convenient in arrangement, and shows no evidence of having been sacrificed for elevations, only too frequently the case. Entrance doors glazed; reception hall and stairs finished in red oak, central fireplace having ornamental mantel shelf above; re eption room trimmed in pine, painted, has built-in seat; parlor, in same wood, painted cream, has sliding doors to dining-room, trimmed in chestnut, with angle fireplace, and entrance to kitchen, trimmed in white pine natural, complete with usual fixtures, through the butler's pantry, provided with sink, dressers, etc.; rear porch ceiling is packed with mineral wool. Second floor is divided into four chambers (one with angle fireplace), sewing and bathroom, having fixtures of best make and plumbing exposed. The attic is divided into one chamber, nursery, den, two servants' room and bath, hall and ample storage space. These two floors trimmed in poplar. Cellar, cemented, contains laundry, with three trays and closet. dormers. The hall is square and is handsomely finished in quartered oak. It contains an ornamental staircase with newels, balusters, rail and divan, and an open fireplace built of Tiffany brick, with facings and hearth of same. The parlor is treated in enameled white, and is provided with fireplace with yellow-tiled facings and hearth, and mantel made from special design and treated same as trim. The library is trimmed with butternut finished natural. It has a fireplace and trimmings of Tiffany brick, and book-cases built in. The dining-room is trimmed with oak, and it also has an open fireplace of Tiffany brick, with hearth and facings of same, and wrought-iron trimmings. The kitchen and pantries are wainscoted and fitted up with the usual best modern fixtures complete. The second floor contains six bedrooms, ample closets and bathroom. This floor is trimmed with pine and is finished natural. Bathroom is wainscoted and is fitted up with exposed plumbing and porcelain fixtures. The third floor contains billia[illegible]om and three bedrooms. Cemented cellar contains [illegible]e and other necessary apartments. Messrs. Hapgood & Hapgood, architects, Hartford, Conn.

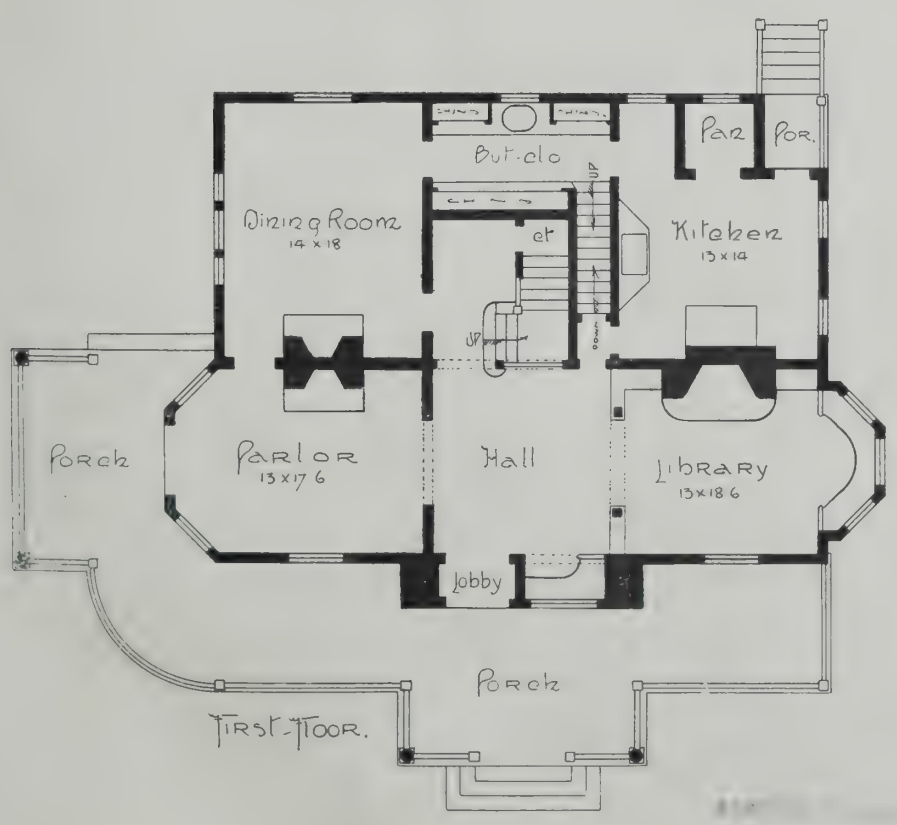
Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

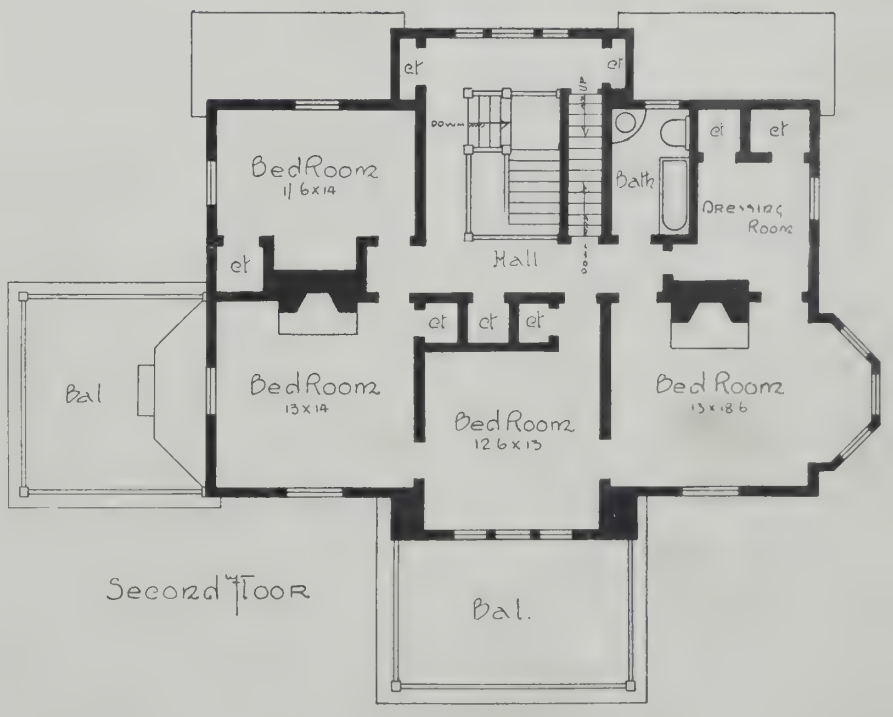
A RESIDENCE AT ORANGE, N. J.

We illustrate herewith, in this issue, on page 26, a residence erected for George Richards, Esq., at Park Avenue, Orange, N. J. The engravings present a picturesque design, with its lines finely executed in a graceful, well-broken manner, and the whole providing many excellent features of interest. The underpinning is built of rock-faced red sandstone. The superstructure throughout of wood is covered on the exterior with shingles stained a weather-beaten brown color, while the trimmings are painted cream white. The roof is shingled, and also the

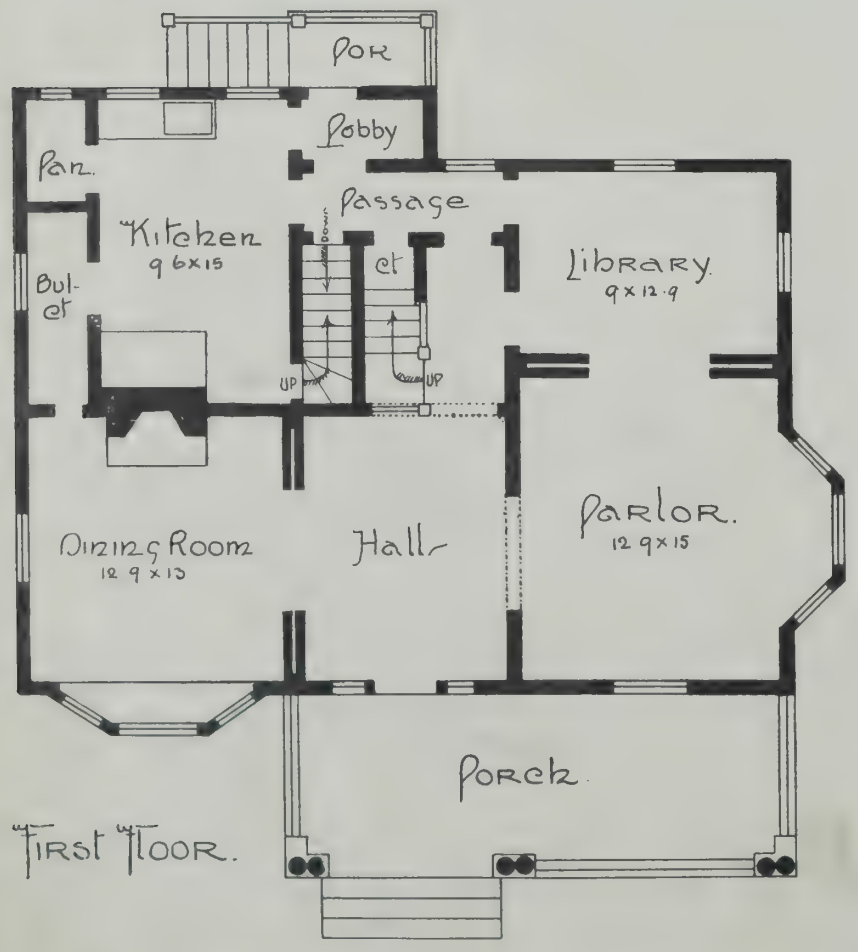


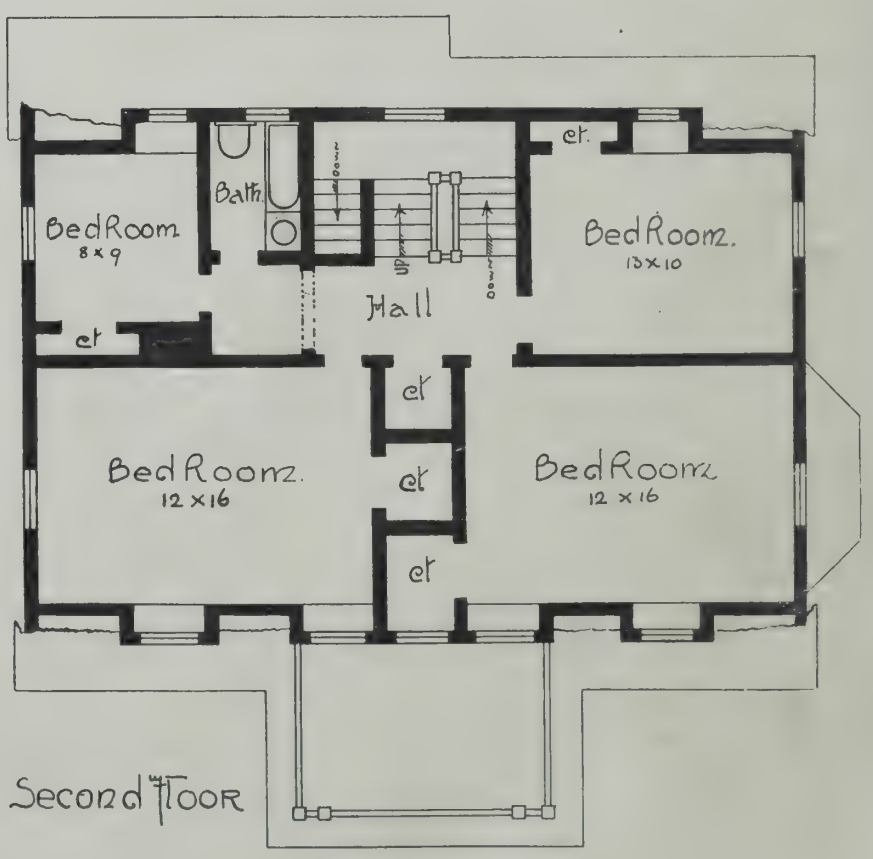
RESIDENCE AT INTERLAKEN, N. J.—See page 34.



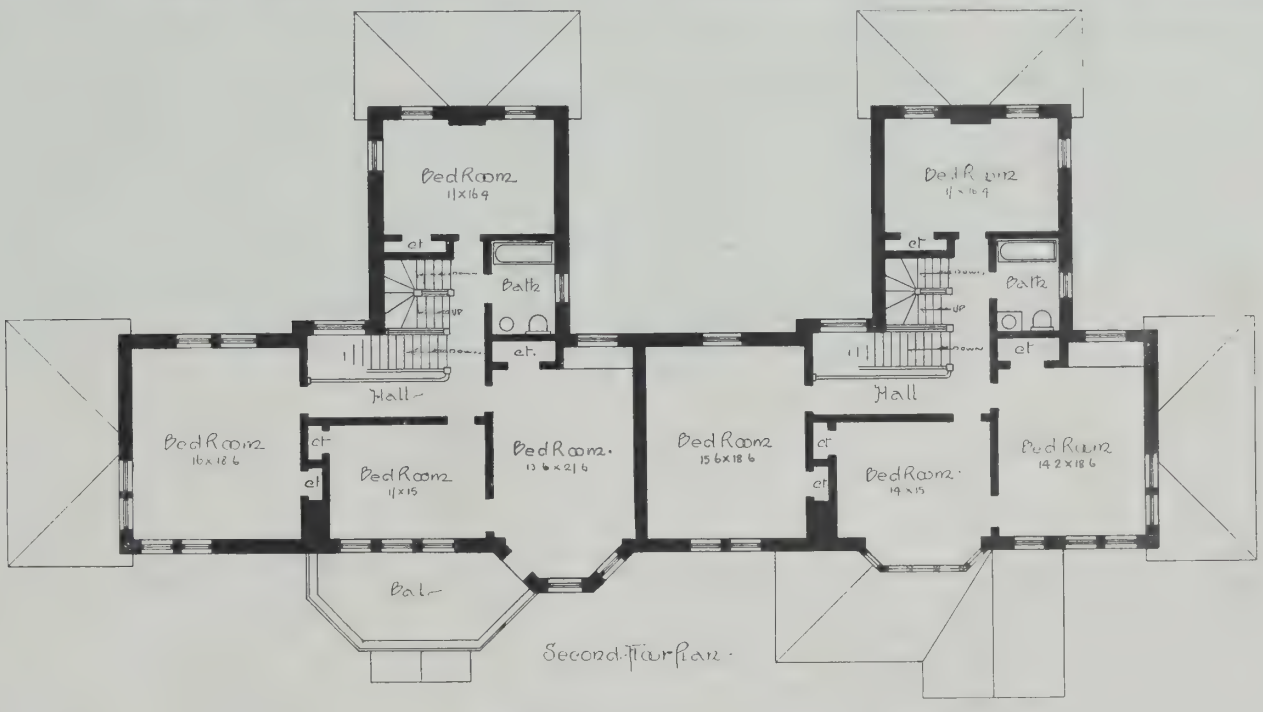


A RESIDENCE AT ENGLEWOOD, N. J.—See page 21.

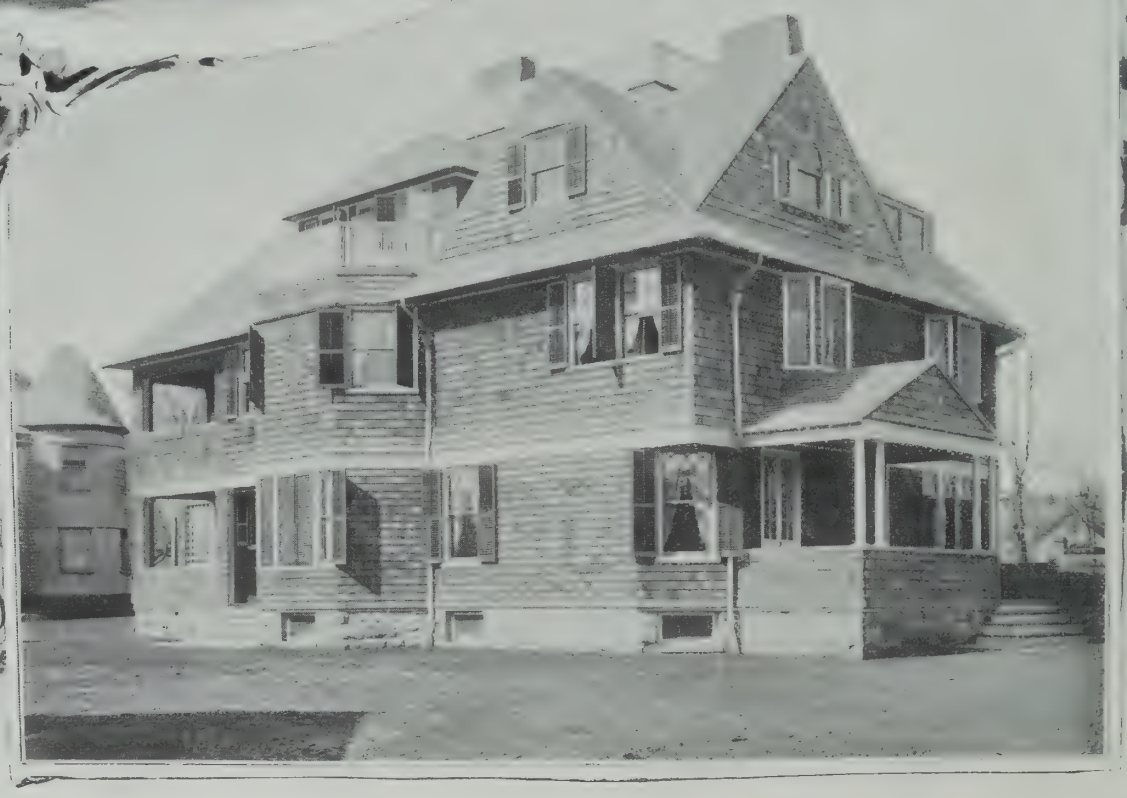


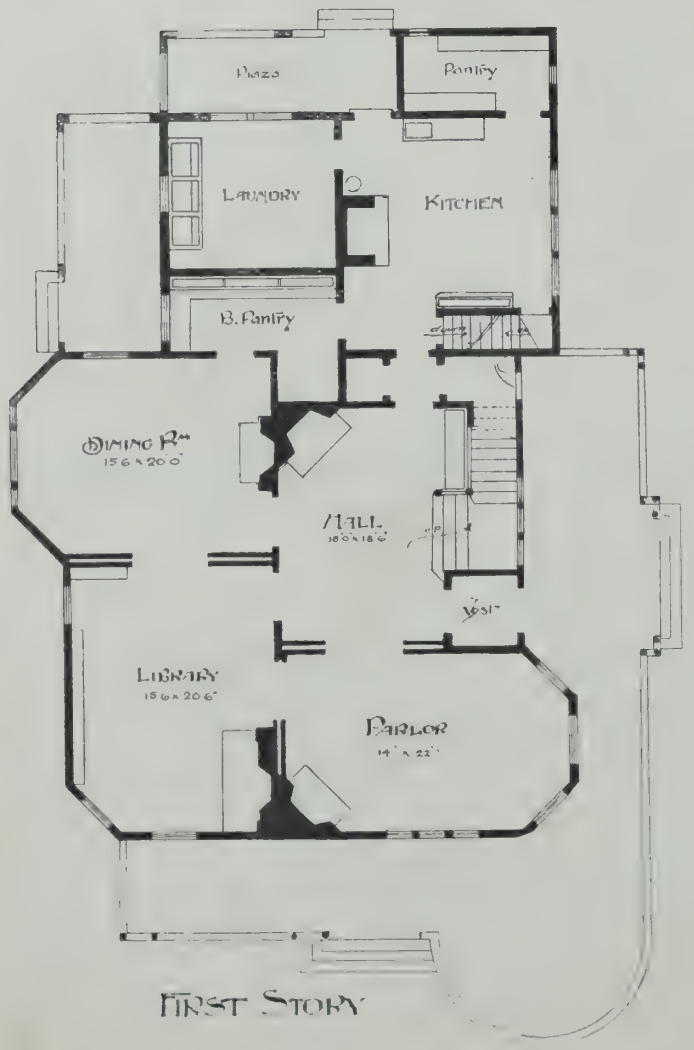


A COTTAGE AT NEWTON CENTRE, MASS.—See page 20.

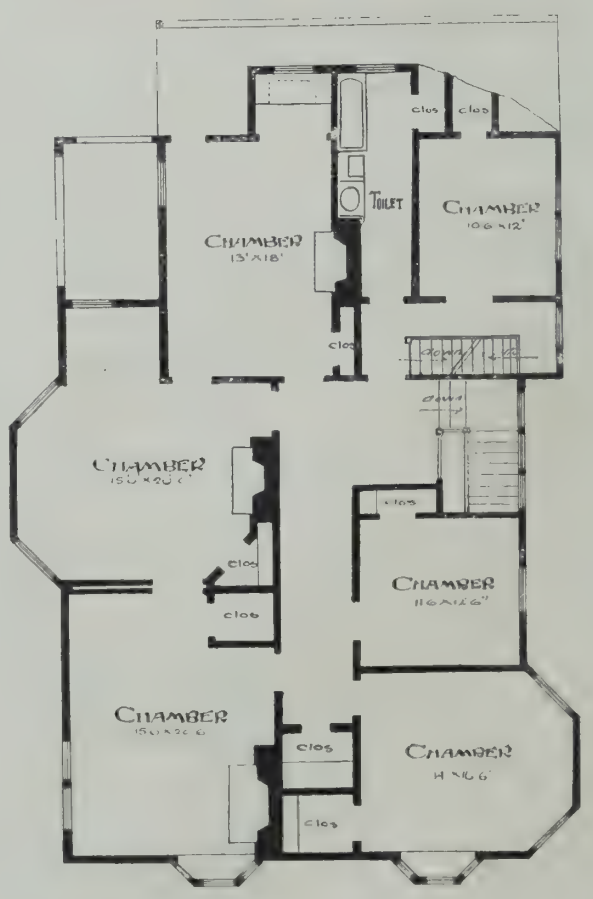


A DOUBLE DWELLING HOUSE AT OVERBROOK FARMS, PA.—See page 34.



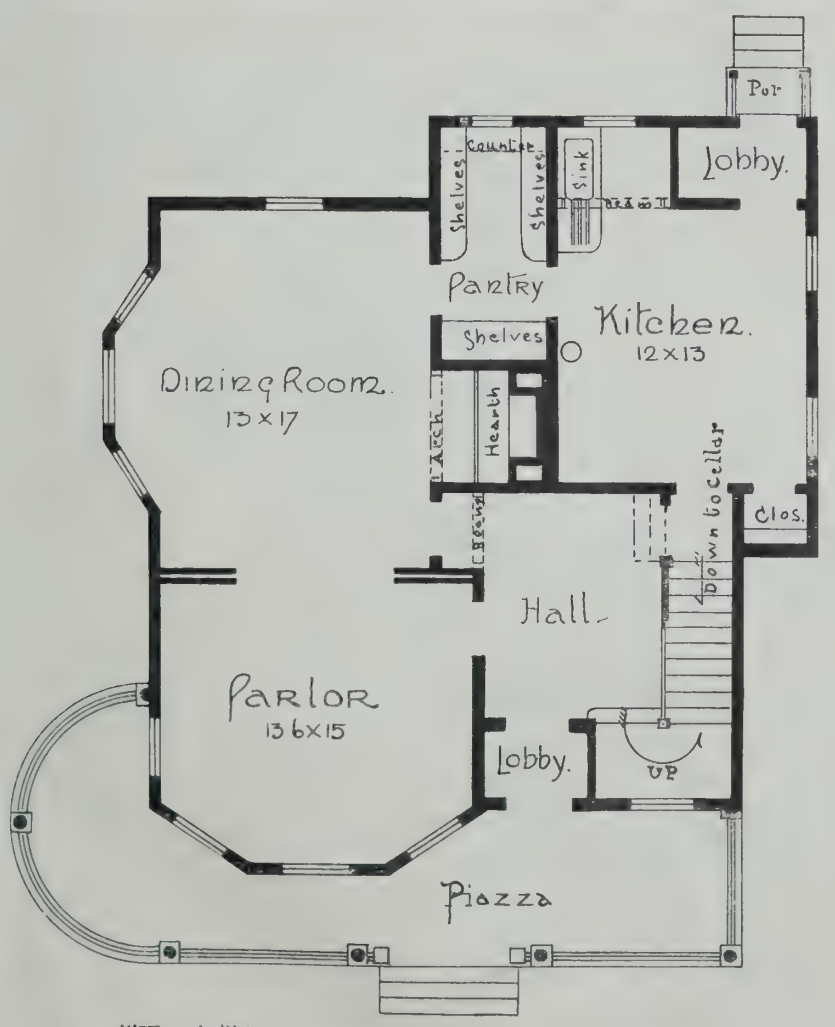


First Story

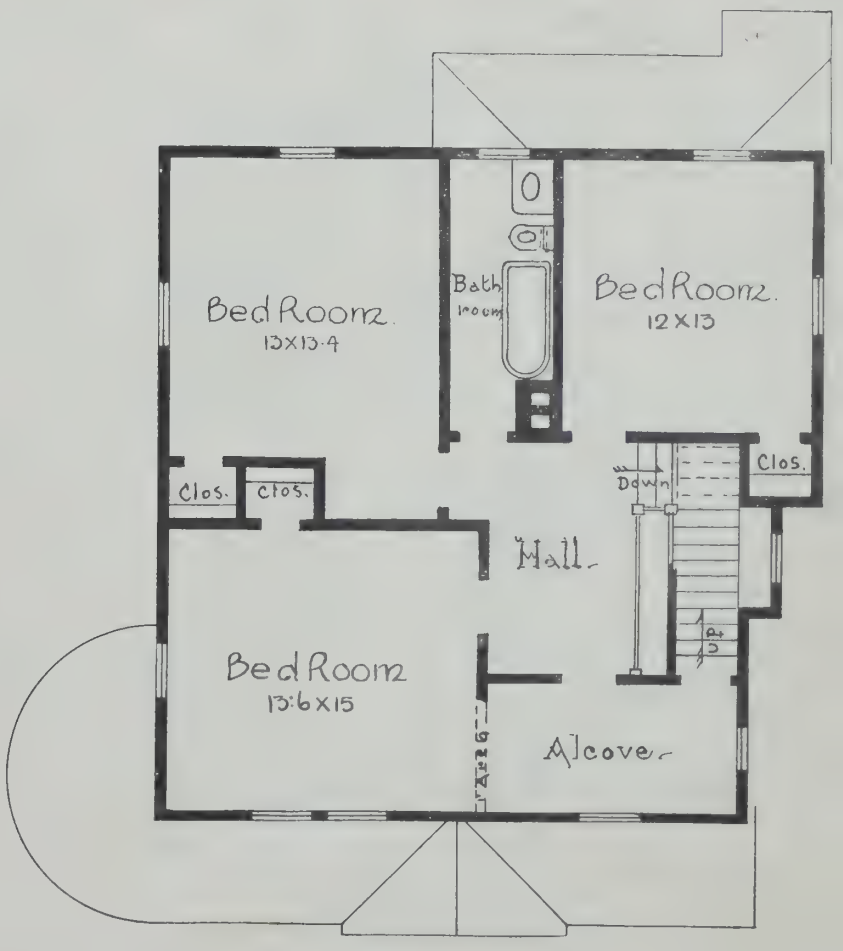


Second Story Plan

A RESIDENCE AT ORANGE, N. J.—See page 21.

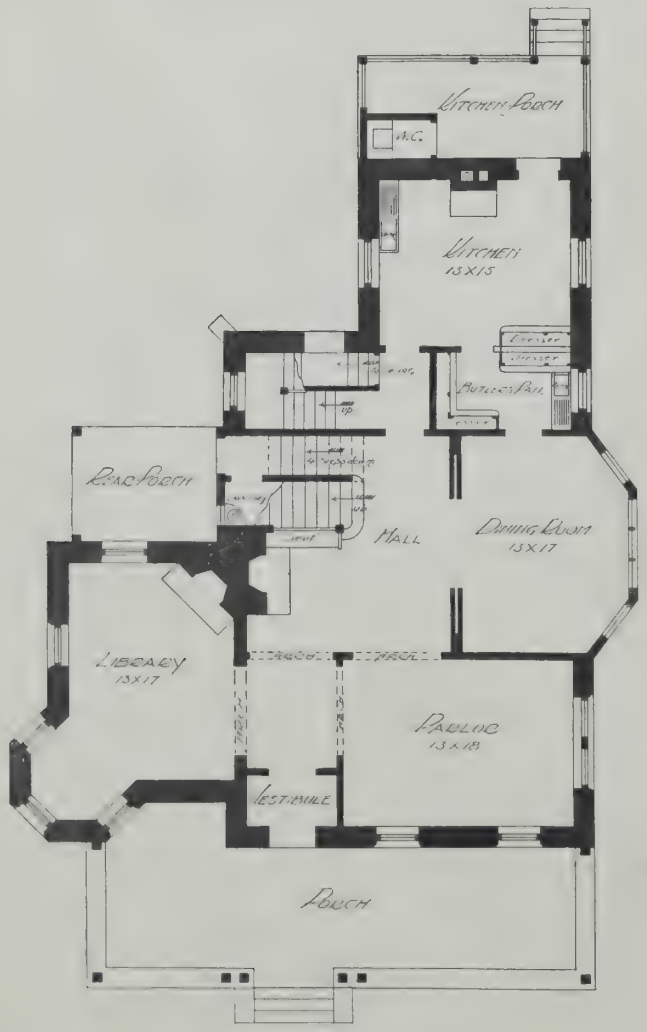


First Floor.

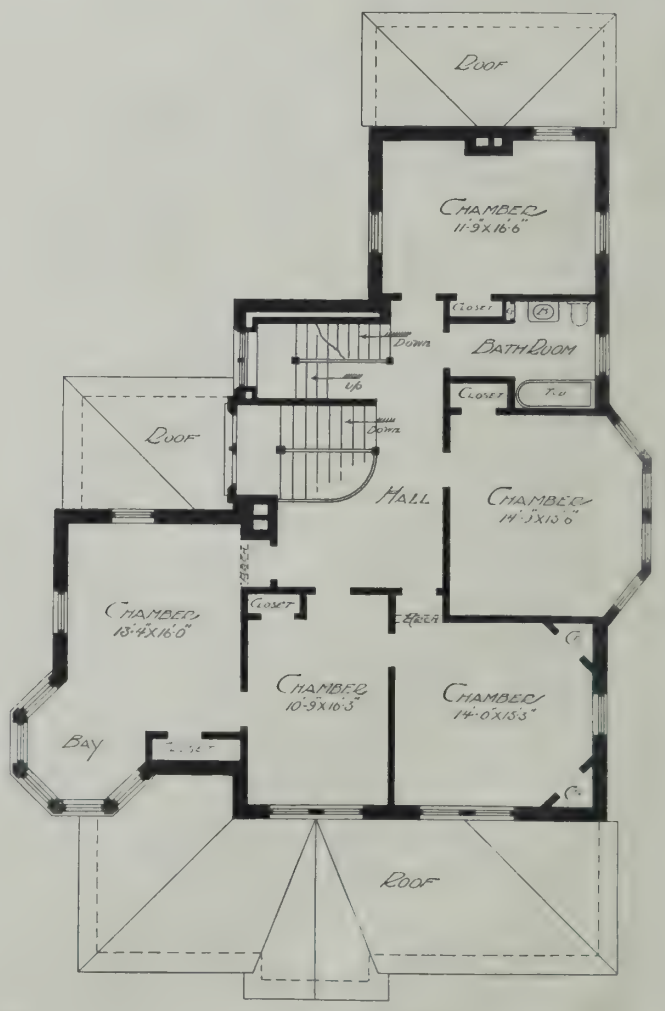


Second Floor.

A MODERN DWELLING AT BRIDGEPORT, CONN.—See page 20.

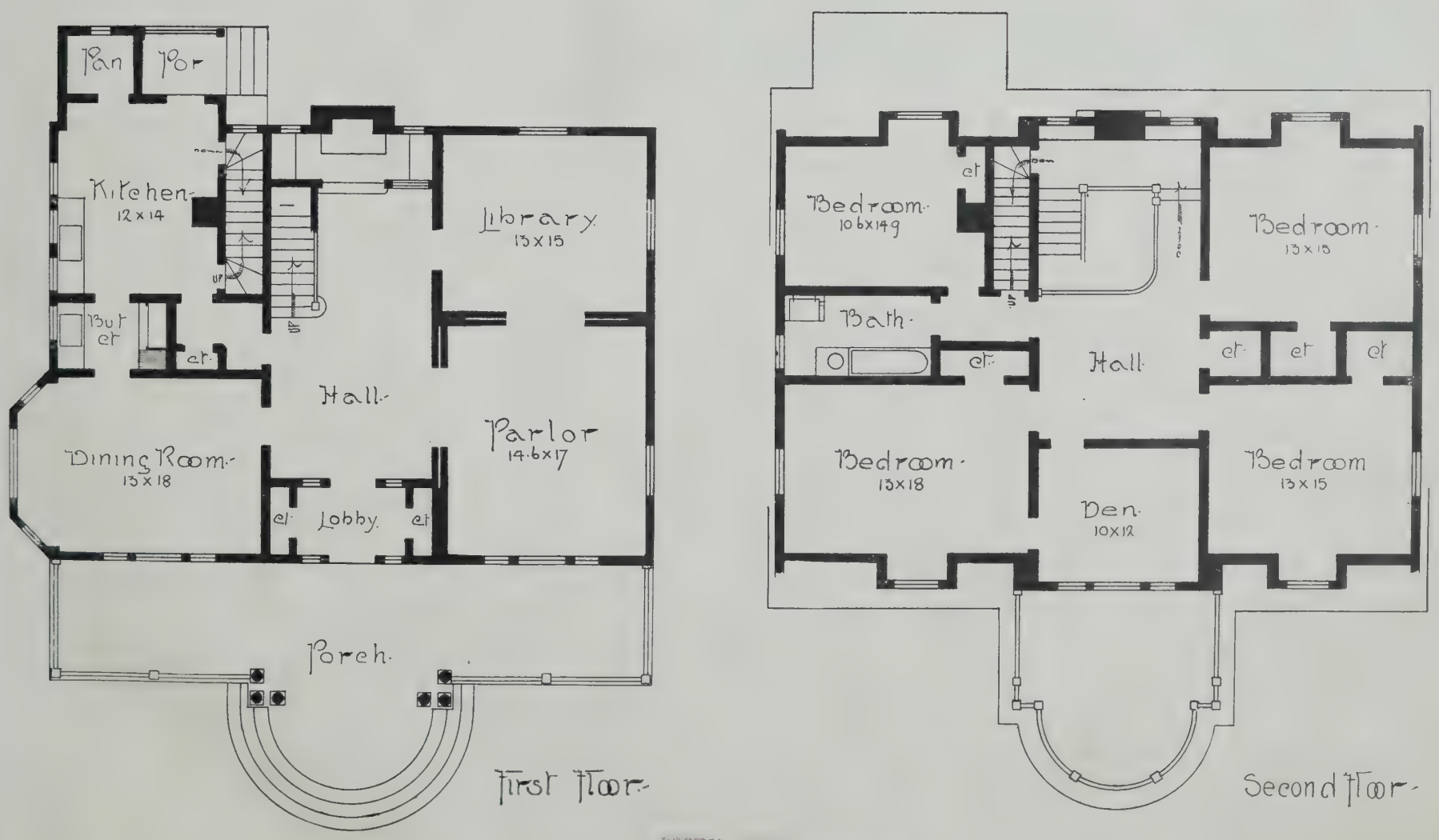


FIRST FLOOR PLAN.

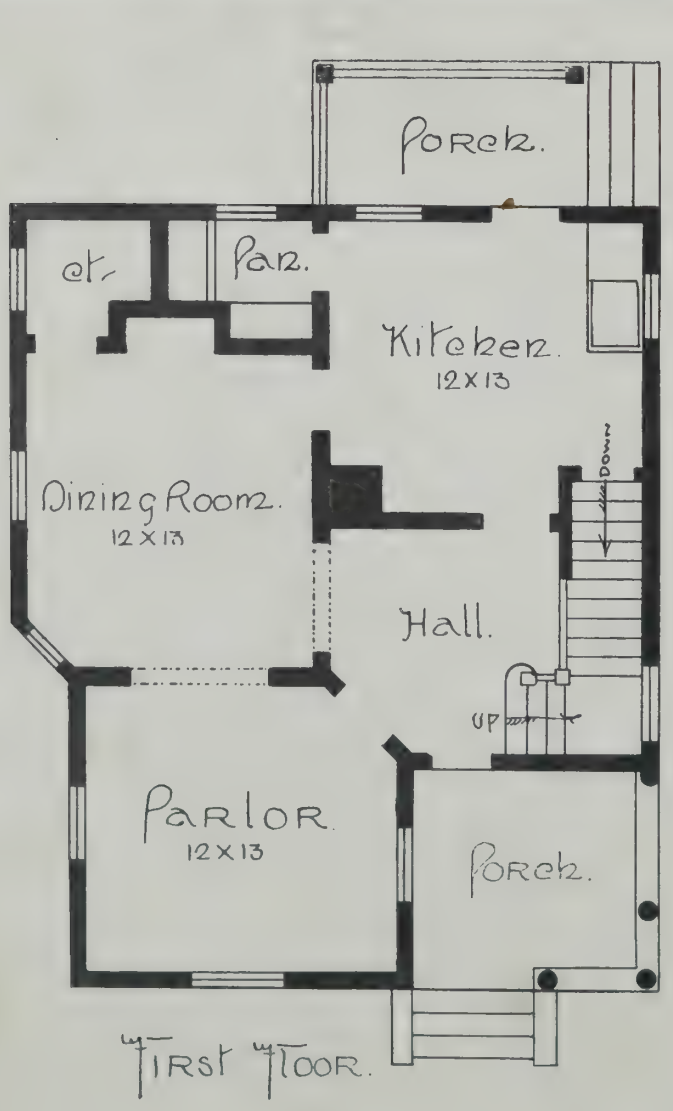


SECOND FLOOR PLAN.

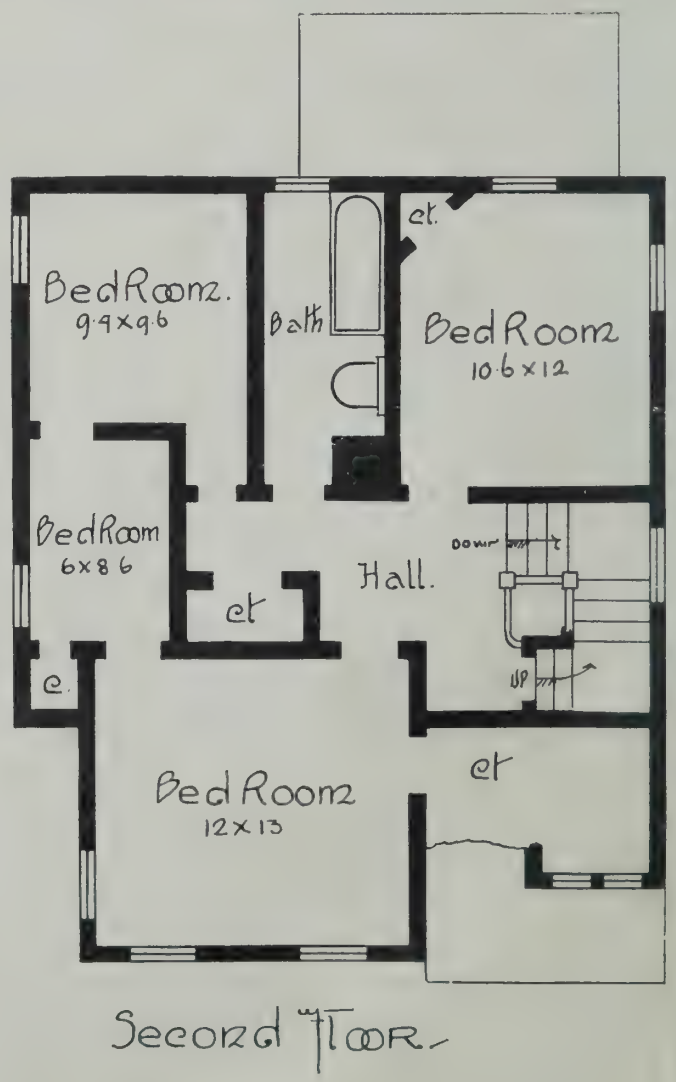
A RESIDENCE AT PHILADELPHIA, PA.—See page 34.



A COLONIAL RESIDENCE AT SPRINGFIELD, MASS.—See page 35.

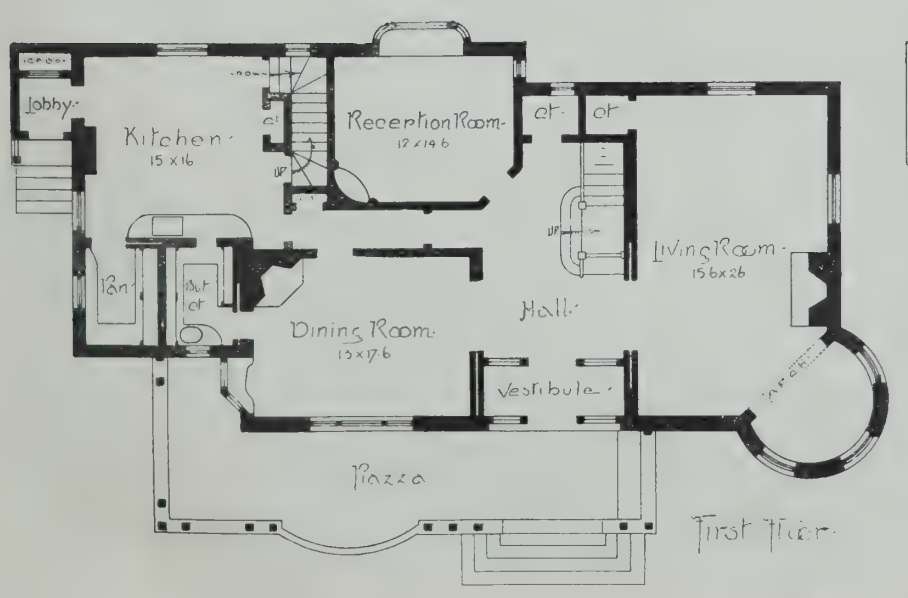


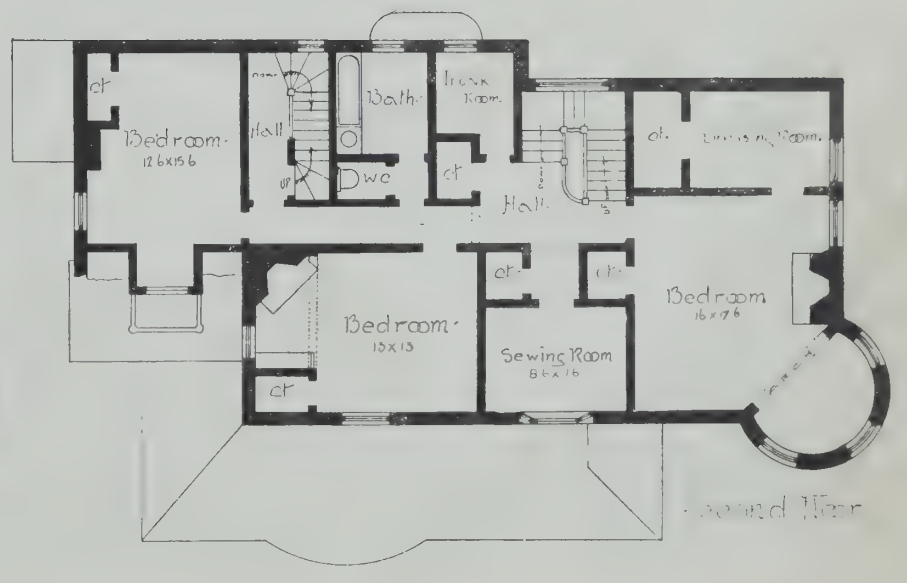
First Floor.



Second Floor.

A COTTAGE AT BINGHAMTON, N. Y.—See page 35.





A RESIDENCE AT PORTLAND, ME.—See page 34.

NEW MASSACHUSETTS STATE LIBRARY BUILDING, AT BOSTON, MASS.—See page 34.

NEW MASSACHUSETTS STATE LIBRARY BUILDING, AT BOSTON, MASS.—See page 34.

THE NEW MASSACHUSETTS STATE LIBRARY BUILDING, AT BOSTON, MASS.

We present in this issue, on pages 32 and 33, engravings illustrating the new extension to the Massachusetts State Capitol at Boston, Mass. The corner stone of the old Capitol building, a view of which can be seen at the left of the picture, was laid on July 4, 1795. This building, usually spoken of as the "Bulfinch Building," derives its name from the fact that Bulfinch, the first and one of the greatest American architects, designed it, and it has always been considered his masterpiece. The facilities of this building having been inadequate for many years, it was decided that the sadly needed room for the various departments of the State government be enlarged, and in 1889 the construction of the extension was authorized, and land was taken for the purpose in the rear of the Capitol, on the north slope of Beacon Hill. The corner stone of this building was laid with appropriate exercises by Gov. Ames, on December 21, 1890. The design was intended to harmonize with the Bulfinch front, and this idea is carried out in detail; but when you take into consideration that the new structure is more than twice the size of the Bulfinch building, you will readily see that it greatly dwarfs the latter, and that the effect sought has not been materialized. When the commissioners in charge of the construction in 1894 realized this defect, they very rapidly urged the demolition of the old Capitol building, and to construct an entirely new one. This proposition naturally raised an indignant and universal protest throughout the commonwealth, and when an attempt was made to pass a bill through the Legislature to demolish this old Capitol building, rich in its style of architecture, with its colonnaded front and gold crested dome, standing as it does with historical interest upon a site overlooking the famous Boston Commons, and making a picture which is dear to the heart of every true Bostonian, it was rejected by the Legislature, and the patriotic sentiment of the commonwealth won a victory over that of vandalism, hence the preservation of the old State House. There is a strong feeling that the reconstruction of the old part, made necessary by new conditions, should proceed with the most thoughtful regard for the spirit of Bulfinch historic design, while making such changes as are essential to protect it against any ill treatment or injurious effects. The new extension which we present, and more particularly use as an illustration, is constructed of yellow brick, with white marble trimmings, simulating the familiar yellow and white of the colonial style. The underpinning is built of rock-faced stone, the first story of dressed stone, and the remainder of the structure of brick, while the whole is surmounted with a massive frieze and balustrade. The only necessary requisite in a building of this character is the necessary apartments and their respective dependencies, and in the present case the actual and most essential requirements have been secured, and while the architecture is of a classic order, it is of the simplest expression, and how very effective an expression it is, when you take in consideration that the building was designed in keeping with the old building, and the general scheme of style and color is carried out with consistency to the last detail. The absolute plainness of the basement, except the outlying porches, the treatment of which is still severe, gives value to the arcades above, which is still further enhanced by the absolute plainness of its inclosing wall The highest merit of the detail is that all of it tends to promote a high expression, and is far more valuable in its place, owing to its proper adjustment, which has been studied with complete success with reference to its situation and material. The outcome of the study that has been devoted to this work in composition, modeling and ornament, can safely be called a classic piece of architecture with Romanesque feeling. The interior of the extension is pleasant, cheerful, well ventilated, and convenient. It contains the various administrative and executive departments of the commonwealth, and includes two handsome halls, that of the House of Representatives and the State Library, besides various committee rooms. The Senate remains in its chamber in the old building. The new Hall of Representatives is a handsome and richly decorated room, considerably larger than the old hall. The amphitheatre shape, with its domed ceiling, lends itself well to fine decorative effects The treatment is in the Italian Renaissance. Some of the prominent features of the scheme are the names of fifty-three men, prominent in Massachusetts history, inscribed in the frieze, beginning with John Carver and ending with Phillips Brooks. The names of the counties in the stained glass skylight, and the symbols of statecraft, law, commerce, science, industry and art that occupy panels in the coning and elsewhere, are also good features. Five large panels on the wall are intended to be occupied by decorative pictures representing events of Massachusetts history. The next department of importance is the State Library room, of which we give illustrations. Owing to the modern architectural effort being toward permanency, a demand has necessarily risen for fireproof interior fixtures, and if perfect security is to be obtained, not only must an apartment be fireproof, but also all its fixtures and its furniture, its connecting doors, interior trim and protecting shutter. Up to a comparatively recent period, these could not be secured of non-inflammable material, except at a large cost and in an unattractive form. The question in regard to the safe custody of the Public Records has become a grave necessity, and while considerations looking toward their longevity are justly recognized as of such importance as in some cases to be prescribed by statute, the prime factor for their safety still remaining for absolutely safe quarters for their custody and protection. The commission of experts having had these ideas in consideration, they adopted a basis upon which such a means could be materialized, and it does so conform in every respect. As an example of perfection in metallic building for interiors, we present a few specimen illustrations of the interior of the new State Library, the first of which is an interior view of the reading-room, delivery counter, desks and stack work, of which a glimpse is shown through the opening at end of room, this metallic work being of the highest order. A more detailed view is given of the alcove cases, which are built up of steel plates, ornamented with solid bronze ornaments and mouldings, fitted with marble base, and the Fenton system of adjustable library shelving. The third view is taken from the gallery in the stack-room, and presents what the Fenton Company claim as one of their most important products, a perfect system of metallic library stack work, embodying all the points of lightness, ventilation strength and utility, which were called for in the specification of twenty-one requirements as the essentials in a perfect system of library stacks. This metallic work must come with peculiar interest to architects and the building trades who have in consideration works of this character. The metallic work in this building has cost $125,000, and it was designed and built by the Fenton Metallic Manufacturing Company, with general offices and works at Jamestown, N. Y., and a New York office at 621 Broadway. The Capitol has one of the finest heating and ventilating plants in the world, constructed according to plans under Prof. S. H. Woodbridge, of the Massachusetts Institute of Technology. Another feature of particular interest is the lighting with electricity, furnished by a large isolated plant. The library stack-room is splendidly lighted by a system that is certainly unique. Each tier is lighted by turning a switch. In the usual system of lighting library stack-rooms, the turning on of the current lights the lamps overhead, but in this State Library the wiring is done so that when the current is switched on the lamps underneath the glass floor are also lighted as well as those above, thus the light shines up through the glass floor, rendering access to volumes on the lower range as easy as those in the middle. Those who have had occasion to use libraries which have been poorly lighted would appreciate this convenience. The buildings will have properly laid out parks surrounding same when completed, and which will add much value to picture presented.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

RESIDENCE AT INTERLAKEN, N. J.

We illustrate, on pages 19 and 22, the residence of Charles H. Thomas, Esq., at Interlaken, N. J. The design is very successfully treated in the colonial style, and is appropriate to its surroundings, having a broad, well shaded veranda, with Tuscan columns grouped on shingled piers supporting the roof above, which at entrance is formed into a pediment; the circular end, with its shingled rail, makes a pretty effect. The house is gable roofed, overhang projecting to face of bays beneath, and supported by brackets of simple detail. The rounded bays, forming circular dormers above, with balcony between, are a pleasing feature of the design, and relieve the roof lines. Sash are effectively divided by wooden muntons. Chimney of mottled brick, capped with stone, has small dormer window breaking through centre. Dimensions: Front, 48 ft. 6 in.; side, 49 ft., exclusive of veranda projections. Heights: Cellar, 7 ft.; first story, 10 ft. 3 in.; second story, 9 ft. 9 in.; attic, 8 ft. 3 in. Underpinning of brick; all exterior frame work above sheathed, papered, shingled with Virginia cedar shingles and left to weather. First floor plan shows a broad reception hall with wide bay, having mullioned window and seat its full width; large fireplace of brick, with mantel above, paneled wainscoting, and three fluted Ionic columns supporting flat arches above; slender spindle balusters run to ceiling, which shows beams exposed; wide stairs of easy rise have landing in bay, turned balusters and square paneled newel post; finish, yellow pine; 7 foot sliding doors lead to dining-room, trimmed in oak, having bay its full width, and fireplace with mantel above. This room connects with kitchen, complete with usual fixtures, through butler's pantry, having sink, dresser, etc. Reception room, or parlor, is finished in painted pine, hardwood floors. Second floor is divided into three chambers (principal one having private bath, which, as well as the other, is provided with best plumbing and fixtures), two servants' rooms and nursery; attic unfinished. Cellar, cemented, contains hot air heater, fuel and storage rooms; finished, except where noted, with yellow pine. Cost, complete, $8,500. Messrs. Romeyn & Stever, architects, No. 48 Exchange Place, New York City.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A PORTLAND RESIDENCE.

We present herewith, on page 31, a residence recently erected for Harry Butler, Esq., at Portland, Me. The building is designed for a town house, and the main walls are constructed of brick, with red sandstone trimmings. The roof is covered with shingles and stained a moss green. Dimensions: Front, 68 ft. 9 in.; side, 35 ft., not including piazza. Height of ceilings: Cellar, 7 ft 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. Vestibule is trimmed and paneled with oak; the floor is laid with tiles. Hall is trimmed with oak. It has a paneled wainscoting and ceiling beams. The staircase is a handsome one, with broad landings, carved newel posts, seat and a cluster of stained glass windows, lighting with good effect. The floor is laid with oak. Reception room is treated with ivory white and gold in a most excellent manner, and is provided with a corner and window seat. Living-room, trimmed with cherry, is provided with an oak floor, a nook with archway and spindle transom, and an open fireplace, with tiled hearth and facings, and a massive carved mantel with columns and mirror. Dining-room is trimmed with whitewood and finished natural, and has a birch floor, window seat and a corner fireplace. Kitchen, pantries, and rear hall are trimmed and wainscoted with whitewood, and each apartment is furnished with the usual fixtures. The second floor, and also third floor, are trimmed with natural whitewood. The former contains three bedrooms, dressing, sewing, trunk and bath rooms, while the latter contains three bedrooms and ample storage. The bathroom is wainscoted and furnished complete with exposed plumbing. The bedroom, over dining-room, has a pleasant nook with paneled divan, and fireplace fitted up complete. Cemented cellar contains furnace, laundry and other necessary apartments. Mr. John Calvin Stevens, architect, Oxford Building, Portland, Me.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American

A TWIN HOUSE.

We present, on page 25, a most excellent design for a pair of houses, built of stone and mortar, and embracing a new idea in twin houses, and which have been recently erected for the Overbrook Farms Company, at Overbrook, Pa. The design is treated in the English Gothic style of architecture, and it has many unique features, and the most striking and novel one is the verge boards at gables, which are very handsomely cut and executed. The brick wall rising up through roof and between the buildings is a dividing line, and according to the ordinance of Philadelphia. The first story is built of Chestnut Hill granite of a bluish gray color; the second story is plastered. The gables are beamed, forming panels, which are filled in with similar plaster work. The roof is shingled and finished natural Dimensions: The front is 100 ft., including both houses, and the depth 35 ft., exclusive of piazzas. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. Both houses are trimmed alike, so a description of one will suffice for the other. The plan is most excellent, and the apartments are so arranged as to be provided with light and ventilation at both ends of the room. The vestibule is paneled in oak and provided with a tiled mosaic floor. Hall is trimmed with oak, and is furnished with a paneled wainscoting and ceiling beams. It contains a nook, separated by a spindle transom and archway, and provided with a paneled seat and an open fireplace built of brick, and furnished with a tiled hearth and a mantel made from special design. The staircase is a very handsome one, and is fitted up with carved newel posts, balusters and rail; it is lighted effectively by stained glass window on first landing. Parlor is treated in white and gold, and is furnished with a fireplace with tiled hearth and facings, and a mantel to correspond with the trim. Dining-room is trimmed with oak. It has a paneled wainscot and seat. Kitchen is isolated from the other apartments by the butler's pantry and rear hall, which is a good feature. This kitchen is trimmed and wainscoted with yellow pine, and is fitted up complete with the best modern conveniences. The second floor is trimmed with sycamore, and it contains four bedrooms, closets and bathroom, the latter tiled and furnished with the usual fixtures and exposed plumbing. Third floor contains two bedrooms and trunk-room. Cemented cellar contains laundry and other necessary apartments. The house is electric wired for call and light, and is heated by the central plant. Cost $15,000. Mr. W. L. Price, 731 Walnut Street, Philadelphia, Pa., was the architect.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A RESIDENCE AT PHILADELPHIA, PA.

We present herewith, on page 28, a residence recently completed for Messrs. Wendell & Smith, at 6361 Overbrook Avenue, Philadelphia, Pa. The engravings illustrate a commodious residence, carefully designed, devoid of unnecessary ornamentation, yet pleasing of outline and contrast in color. There are many pleasing features about the elevations, and the plans are well arranged. The first story and balustrade at front piazza are built of

stone of a grayish color, soft in tone but hard in texture. It is cut in a neat manner and is laid up with rough faces. The second story and gables are of the English half-timbered order, with the brownish-stained timbers forming panels which are filled in with stucco plaster work. The roof and dormer windows are covered with slate of a reddish hue. The chimneys are built of red brick. Dimensions: Front, 42 ft. 6 in.; side, 53 ft. 6 in., not including porches. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. From the vestibule are arched openings to staircase, hall, parlor and library, all of which are finished in oak; the latter is trimmed with quartered oak and is provided with corner fireplace furnished with tiled hearth and facings, and mantel of excellent design. The staircase in hall has a square newel and slender balusters. At the angle of staircase and fireplace is a paneled divan. Under this staircase is a lavatory convenient to hall and rear porch. The parlor is finished in a dainty manner, with buff-tinted walls. Kitchen is wainscoted, and it contains the usual fixtures and stairs to cellar and second floor. The second floor contains five large bedrooms, closets and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed plumbing. Third floor contains three bedrooms and ample storage. Cemented cellar contains furnace, laundry and other necessary apartments. Mr. W. L. Price, architect, 731 Walnut Street, Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT SPRINGFIELD, MASS.

We present herewith in this issue, on page 29, a residence, colonial in treatment, which has been erected for Louis F. Newman, Esq., at "Magnolia Terrace," Forest Park, Springfield, Mass. The design has a combination of pleasing elevations and well arranged plans. The underpinning is built of local brick. The first story is clapboarded and painted olive yellow, with white trimmings; second and third stories are shingled and finished natural. The roof is also shingled and finished similar. Dimensions: Front, 46 ft. 8 in.; side, 38 ft. 8 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in.

The vestibule is trimmed with oak. It has a tiled floor, and is provided with two large closets. Hall, spacious, extends through the centre of the building and is trimmed with oak and is provided with an oak floor and an ornamental staircase turned out of similar wood with carved newels. The nook at the end of hall is provided with paneled divans and an open fireplace trimmed with tiles and provided with a mantel of excellent design. Parlor and library are separated by sliding doors and each are trimmed with ash, provided with pine floors, good light and ventilation. Dining-room is trimmed with white wood and finished natural. Butler's pantry and kitchen are trimmed and wainscoted with similar wood, and furnished with maple floors and the best modern fixtures. Second floor is trimmed with whitewood finished natural. It contains five bedrooms, closets and bathroom; the latter is wainscoted and furnished with the usual fixtures, tub, bowl, etc., with exposed plumbing. Two bedrooms and trunk room on third floor. Cemented cellar contains furnace, laundry, and other apartments. Mr. L. F. Newman, architect, Springfield, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT BINGHAMTON, N. Y.

We present herewith in this issue, on page 30, a cottage of moderate cost and design, which has been erected for Robert M. Hayes, Esq., at Binghamton, N. Y. The design is a good one and is a combination of pleasing elevations and well arranged plans. The underpinning is built of rockfaced stone laid up in a neat manner. The exterior framework is clapboarded and painted colonial yellow with ivory white trimmings. The gables are shingled and stained sienna. Blinds painted bottle green. Roof shingled and stained green with mottled effect. Dimensions: Front, 26 ft. 6 in.; side, 32 ft., not including porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with whitewood finished natural. The hall contains an ornamental staircase which is well lighted by several windows at stairway landings. This hall, parlor and dining-room are separated by archways, square in outline, and provided with neat ornamental spindle transoms. Parlor is a good sized apartment and dining-room has a well fitted up china closet and a nook for buffet built in. Kitchen and pantries are well fitted up in a convenient manner. The second floor contains four bedrooms, large closets and bathroom, the latter wainscoted and fitted up complete. The third floor is left open, but if desired several bedrooms could be finished off on this floor. Cemented cellar contains laundry and furnace, and also other necessary apartments. Cost $1,450, complete. Mr. E. Alden Greene, architect, Ithaca, N. Y.

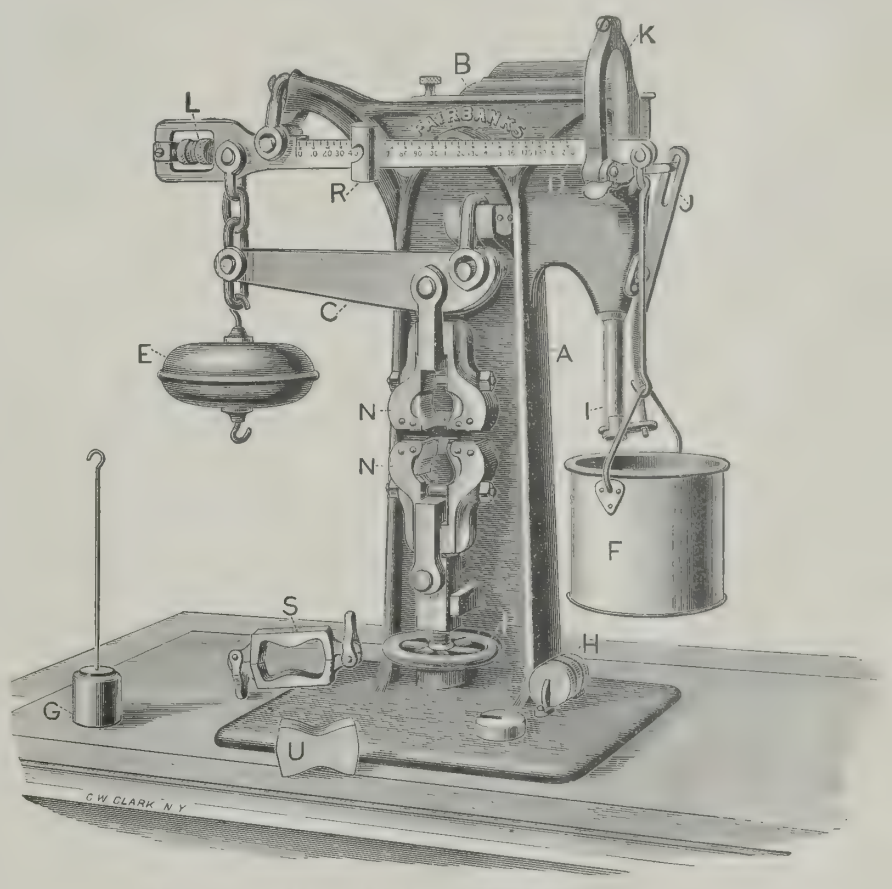
Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A SIMPLE AND ACCURATE CEMENT TESTING MACHINE.

The importance of care in the selection of materials and composition of cements, and the necessity that all cement used in any given work should be of uniform quality and strength, are well understood by all trustworthy builders and contractors. It was not, however, until the introduction of the Fairbanks testing machine, some twelve years ago, that it became an easy and convenient matter to quickly and accurately test any sample of cement as might be required, this machine being automatic in its operation, and so compact that it may be placed on a small table, or shelf, in any office. In the machine shown in the accompanying illustration have been embodied some recently patented improvements, the most important of which are the adjustable clamps, *N*, *N*, hung on steel points and ball bearings. Their bearing surfaces are free to adjust themselves quickly and accurately in any direction to the slight inequalities of the briquette, without any lost motion, so that the briquette, under tension, will be broken fairly in its smallest section.

In the illustration, *S* represents the mold in which the sample briquette is made, the mold being laid on a smooth board or glass plate and filled with mixed cement, when the top is struck off even with the top of the mold. After the cement has set sufficiently, the fastenings at the ends are loosened, and the mold is carefully taken away from the specimen. To make the test, the cup, *F*, is hung on the beam, *D*, as shown; the poise, *R*, placed at the zero mark; the beam balanced by turning the ball, *L*, and a hopper, *B*, at the top, filled with fine shot. The molded sample of cement, *U*, is then placed in the clamps, and the hand-wheel, *P*, is adjusted, so that the graduated beam, *D*, rises nearly to the stop, *K*. A valve, *J*, is then opened to allow the shot to run into the cup, *F*, through the pipe, *I*, the shot continuing to run until the specimen is broken by the drawing down of the graduated beam, when the flow is automatically cut off by the valve. The valve itself forms one of the recent improvements of the machine, as it may be adjusted to permit of a larger or a smaller flow of shot, and the point of cut-off is arranged at the discharge end of the pipe, making the weight of shot delivered to the cup correspond more closely to the movement of the beam. After the specimen is broken, the cup, *F*, is hung on the hook under the large ball, *E*, and the shot is weighed in the regular way, using the poise, *R*, on the graduated beam, and the weights, *H*, on the counterpoise weight, *G*, the result showing the number of pounds required to break the specimen.

This machine has been approved by the American Society of Civil Engineers, and the briquette molds form the samples to be tested of the exact size and dimensions called for by the Society, having one square inch as their smallest section. The briquettes are about two inches wide at their widest portions at each end, and, with very slightly rounding outer surfaces, taper inward toward the middle, with a form admirably adapted to be firmly engaged by the clamps, without the binding of the latter on any special line. The improved clamps hold the briquettes in a manner superior to cushioned clamps, and the action of the machine is strictly automatic while the test is being made, there being no parts of the machine to be moved, thereby avoiding danger from sudden jarring, which might break the sample before reaching the limit of its strength. The machines have no springs or hydraulic appliances to get out of order, but are constructed with levers, steel pivots and bearings strictly on the principle of the most improved weighing apparatus The Fairbanks Company, whose main office is at No. 311 Broadway, New York, makes the machines in two sizes, one to test briquettes up to 600 pounds, and another, the one shown in our illustration, in which tests are made up to 1,000 pounds. A mold is furnished with each machine.



THE FAIRBANKS IMPROVED CEMENT TESTING MACHINE.

Guaranteeing Roofing Plates.

TO THE EDITOR SCIENTIFIC AMERICAN:

Revolution in the tin plate business, following its active manufacture in the United States and consequent transfer of the industry from Wales to this country, has made the presentation of roofing tin to the attention of architects only the more active. With a very keen competition the result has been a natural confusion in the mind of many architects. All manufacturers of roofing tin plates have naturally claimed their individual output to surpass all others, and with the verbal claims made, samples exhibited, etc., it is naturally very difficult, if not impossible, for the architect to judge just which specific brand of roofing tin is actually the best, and merits his attention and place in his specifications accordingly. There is no doubt, therefore, that for the protection of architects, who, in their specifications require certain specific brands, and likewise for the protection of the house owner, who is naturally depending upon the architect to secure best material, as far as roofing tin plate is concerned, something more is needed than the exhibit of small samples and the representation of quality as may be given by different manufacturers. Samples are all right. Statements as to the quality and quantity of materials and the method of manufacture are also proper, but in the present condition of the tin roofing business the architect should be protected and backed up in his use of any particular brand by a definite guarantee of wearing quality received from the manufacturer of said brand.

Inclosed herewith we beg to hand you our printed guarantee or warranty of the lasting qualities of the "Scott's Extra Coated" brand, which gives the architect and house owner using this brand definite protection for a period of ten years. There is a reason why a "Scott's Extra Coated" tin roof, given proper treatment, should not last a lifetime, or as long as the building itself. A specific period of ten years is mentioned, and same will doubtless be recognized as a definite business proposition. This company has had many years' experience, first in importing supplies of highest quality roofing plates from abroad, and later in the manufacture of the "Scott's Extra Coated" in this country. We are confident our methods are the very best. We show our confidence in giving a definite guarantee. We believe in the use of strictly best goods, which are warranted. We would be only too pleased to have other manufacturers take the same position as assumed by this company. Tin plate would then be placed on the high plane we consider it deserving as a roofing material.

Very truly,
FOLLANSBEE BROS. COMPANY,
WM. U. FOLLANSBEE, Secretary.

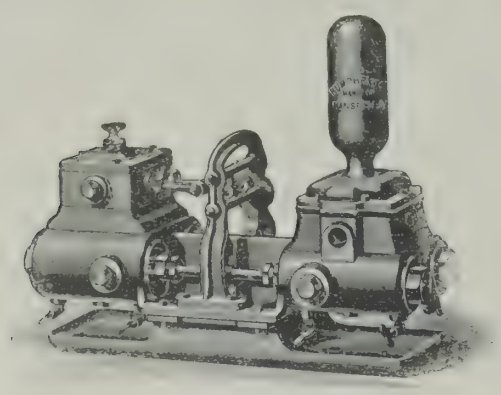
Pittsburg, Pa.

"GATES AND FENCES," as designed and executed by the Winslow Bros. Company, Chicago, forms the subject of an attractive little book in which are many fine half-tone pictures, showing some extremely good specimens of ironwork, from original designs, in ornamental gates and fences. Some of the finest residences in and near Chicago bear witness to the high quality and originality of design of the ornamental iron, bronze, and brass work made by this company.

THE first street tunnel in Germany has been recently opened to traffic at Stuttgart, Wurtemberg. It has a length of 125 meters (410 feet), and the remarkable width of 20½ meters (67 feet). By making the ends of the tunnel funnel-shaped, the necessity of lighting it during the day has been avoided. At night the tunnel is lighted by electricity. The cost was $65,000.—Uhland's Wochenschrift.

AN IMPROVED WATER MOTOR.

The simple, effective, moderate-priced motor shown in the illustration is a modification of a widely known steam pump, and works perfectly in all its parts, requiring only the turning of a valve in the outlet or inlet pipe

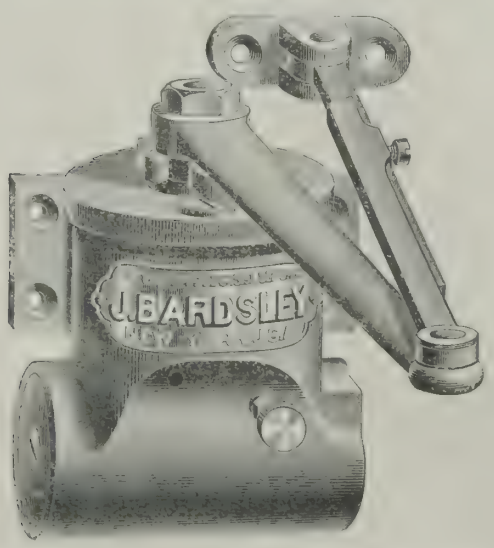


THE HUMPHRYES DUPLEX WATER MOTOR.

to start or stop it. It is made by the Humphryes Manufacturing Company, of Mansfield, Ohio, manufacturers of iron and brass pumps, plumbers' iron ware, etc., and is a wonderful convenience as compared with the old fashioned pump. The working parts are all made of bronze or gun metal, including the cylinders, pistons, cylinder heads, piston rods, valve rods, valves, and stuffing boxes, and, being made in large numbers and with the use of a perfect system of standard steel gauges, the makers can guarantee exact duplicates and make all parts interchangeable. Provision is made for thoroughly draining every part of the machine to prevent freezing. To insure against any possible defect, every motor is carefully and thoroughly tested before leaving the factory.

THE BARDSLEY OIL DOOR CHECK AND SPRING.

This device in its improved form embodies some new and valuable features suggested by the experience of several years in manufacturing this class of goods. It is made without packing in its working parts. The spring cannot be used the wrong way up, and thus get bent out of shape and perhaps broken, a frequent occurrence heretofore. If such an attempt is made, the engaging parts will slip by each other harmlessly. Another source of annoyance has been the breaking of springs, the breaks almost invariably occurring near the inner diameter where the coils are small. In these springs the inner diameter has been enlarged so as to dispense with the small inner coils. A lighter, longer, and more elastic spring is used, giving greater durability. This is permitted by the greater movement given by the larger internal diameter. The checking power cannot be lost through the liquid being forced from the liquid chamber into the spring chamber, as the two are connected by openings. A combination of oils, long and satisfactorily used as a checking medium in the "Checking Spring Hinges" of this make, has been substituted for the mixture of glycerine and alcohol formerly used, and which for various reasons was found unsatisfactory. A reserve oil chamber is provided between the spring chamber and checking cylinder, holding a supply of oil sufficient to last many years. More oil can be added when needed, through the screw-hole in the cap, without removing the check from the door. It has a releasing device, by means of which the checking power is removed when the door is nearly closed, the spring thus exerting its full force to latch the door. This feature is brought into play by an adjustment of the arms, and if not desired need not be used. The new adjustable arm will be found very convenient for above purpose, and also for detaching in summer if door is required to stand open. It may be readily

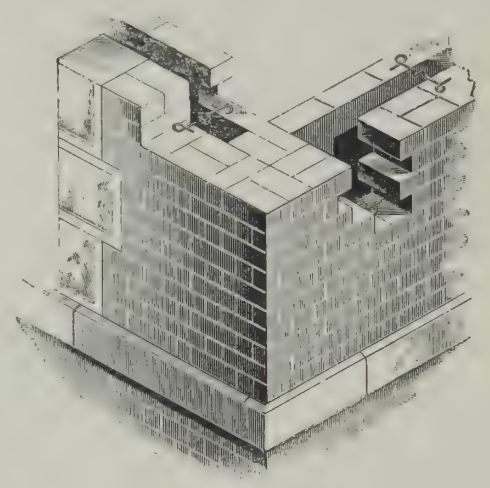


THE BARDSLEY OIL DOOR CHECK AND SPRING.

taken entirely apart. After removing the arm it is only necessary to take out three screws. This is an important feature. If repairs are needed, a broken or worn part may be procured and put in by any one, instead of the expense and delay of sending the check to the factory for repairs. The mechanical action is perfect; the door swinging quickly until it nears the closing point, when it gradually slows and closes softly and gently. The construction is simple and strong, the bearings are long, and the spindle, with crank at lower end, is drop-forged from cold-rolled steel. Mr. Joseph Bardsley, 149 Baxter Street, New York, the manufacturer, will be pleased to furnish further particulars.

STEEL WALL TIES.

The illustration represents a sixteen-inch wall, with four-inch air-space, bonded with Morse ties, a form of tie which is made 7, 9, 12, 16 inches in length, for 3-16, 5-32, ⅛-inch galvanized steel wire, and which is applicable to any situation where the air-space is one inch or more. The ties are preferably placed about two feet apart longitudinally, and one tie for every fourth course. These steel wall ties are not only used for bonding hollow walls, but for tying terra-cotta work, securing pressed or enameled brick facings, anchoring ashlar, marble or jasper facings, bonding linings, and strengthening any form of masonry. They are manufactured, as best adapted for various purposes, by J. B. Prescott & Son,



MORSE PATENT STEEL WALL TIE.

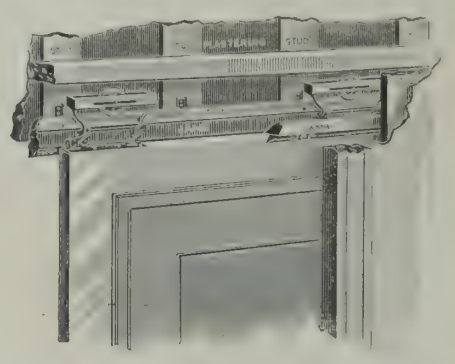
Webster, Mass. The list of public and private buildings in which these ties have been used is a long one, and they are especially serviceable in the most approved modern constructions.

Wax Finish for Hardwood Floors.

American tourists returning from Europe almost always remark upon the handsome appearance of the foreign hardwood floors. In Germany, France, and in some parts of England, the floors always look beautiful. In the United States, nine-tenths of the hardwood floors are very noticeable, though not for their beauty nor well-kept appearance, but on the contrary, on account of their miserable, dirty look. The woods used in the floors of both countries are identically the same, as far as beauty and wearing qualities are considered. Many floors are spoiled by the woods being improperly cured, but the majority of them are bad looking beca se they have been improperly finished. Here in this country more than one-half the floors are finished in shellac, some kind of varnish, or perhaps oiled. The two first-named materials are made up of resinous substances in spirituous solution. When the spirits evaporate, a hard brittle crust is left on the surface. This cannot last, for boot heels or any hard usage whatever will grind this crust to a powder, which is swept away and the floor is left bare in these spots. These cannot be remedied nor patched up without entirely refinishing the whole surface. Oil should never be used, as it darkens the woods and catches dust, soon spoiling entirely the beauty of any floor. In foreign countries, the beauty of the floors forms almost as interesting a feature to the observing tourist as do the historic castles and churches. They are really magnificent. Now, when we here in the United States have floors laid which are at once handsome and just as durable as those laid in Europe, why is it that in this country these conditions exist? The finish used in foreign countries now, and which has been used for centuries, is the wax finish. Take a floor, and when of open grain fill it thoroughly with some silicious filler. This hardens the grain, evens the surface, and makes it ready for the wax. A light coat of this material is thoroughly rubbed into the surface, and when almost dry is gone over and polished with some heavy brush, or cloth well weighted, such as carpet. Floors treated with a wax finish always look well and improve in appearance. The foreign floors seem to become handsomer with age. Many people know of the above facts, but are at a loss as to what to use or where to get some wax prepared for the purpose. S. C. Johnson, a parquet floor manufacturer at Racine, Wisconsin, is also the maker of the finish known as "Johnson's Prepared Wax." Thousands of people throughout the country know of the excellent qualities of his wax finish. This material is put up in paste form, and with but little friction easily spreads. It is put on as thin as possible, allowed to dry about twenty minutes, and then polished with a weighted brush. The floor is given two coats in this manner, when a most beautiful finish exists.

THE STEARNS PARLOR-DOOR HANGER.

The hanger shown in the illustration is single-track and of the anti-friction type. It is made by E. C. Stearns & Co., Syracuse, N. Y. The single track is hung to one line of studding, and the hangers can be put up complete

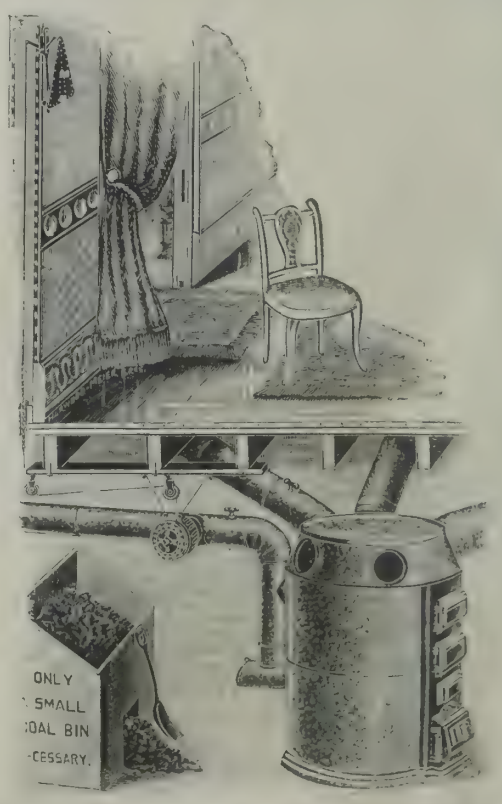


THE STEARNS PARLOR-DOOR HANGER.

in one-third the time required for others. In designing this new single track steel hanger the makers have striven for absolute simplicity, both in the construction of the hanger and rail and in the method of putting up. The track is secured to one partition instead of two, as in the case of the common double wood tracks, and is not subject to derangement from unequal settling of the said partitions. The centre of the wheels is made of vulcanized fibre, the edge of which forms a rolling surface. This fibre centre forms a solid disk, extending to the axle, and is firmly held between plates by means of rivets passing through both plates as well as through the fibre. The axle is of steel, and the bearings are turned perfectly true, making it practically noiseless. Each hanger may be adjusted independent of the other by the use of a screwdriver and without the derangement of any part.

AN AUTOMATIC DRAFT REGULATOR.

The Regulator shown in the illustration consists of a Thermostat that operates by contraction and expansion, a common chain and line connection over two pulleys, and the cylinder damper, with a cast jacket connecting to smoke-pipe. The damper is made with two slotted brass cylinders, the outside part being stationary, while the inside one is pivoted so that it can be easily rotated. The slots are so arranged that when the movable cylinder revolves in one way they are open, but in the opposite position entirely closed. By means of a dial on the thermostatic plate, which simply lengthens and shortens the chain and line connection, the Regulator can be adjusted to any degree of temperature between fifty-five and ninety degrees. As the temperature rises above the desired point, as indicated by the dial, the Thermostat immediately acts, and through the connection over pulleys it causes the cylinder slots to open, admitting cold air into smoke-pipe, and supplying draft to the chimney. This checks the fire, stops consumption of fuel, and prevents temperature from rising. Should the heat fall below the degree indicated by index in rooms above, the Thermostat at once closes the slotted openings by a reverse action, and stops the supply of c ld air to the smoke-pipe. This removes the "check," and allows the draft of the chimney to be exerted upon the fire in the heater, which causes



THE HOWARD AUTOMATIC DRAFT REGULATOR.

combustion to increase as needed to maintain the degree of heat required. It is very evident that the Regulator thus has direct control of the "draft" and "check," and is absolutely automatic. It is very easily connected to any furnace, boiler, or stove on the market. The Howard Thermostat Co., Oswego, N. Y., are the manufacturers.

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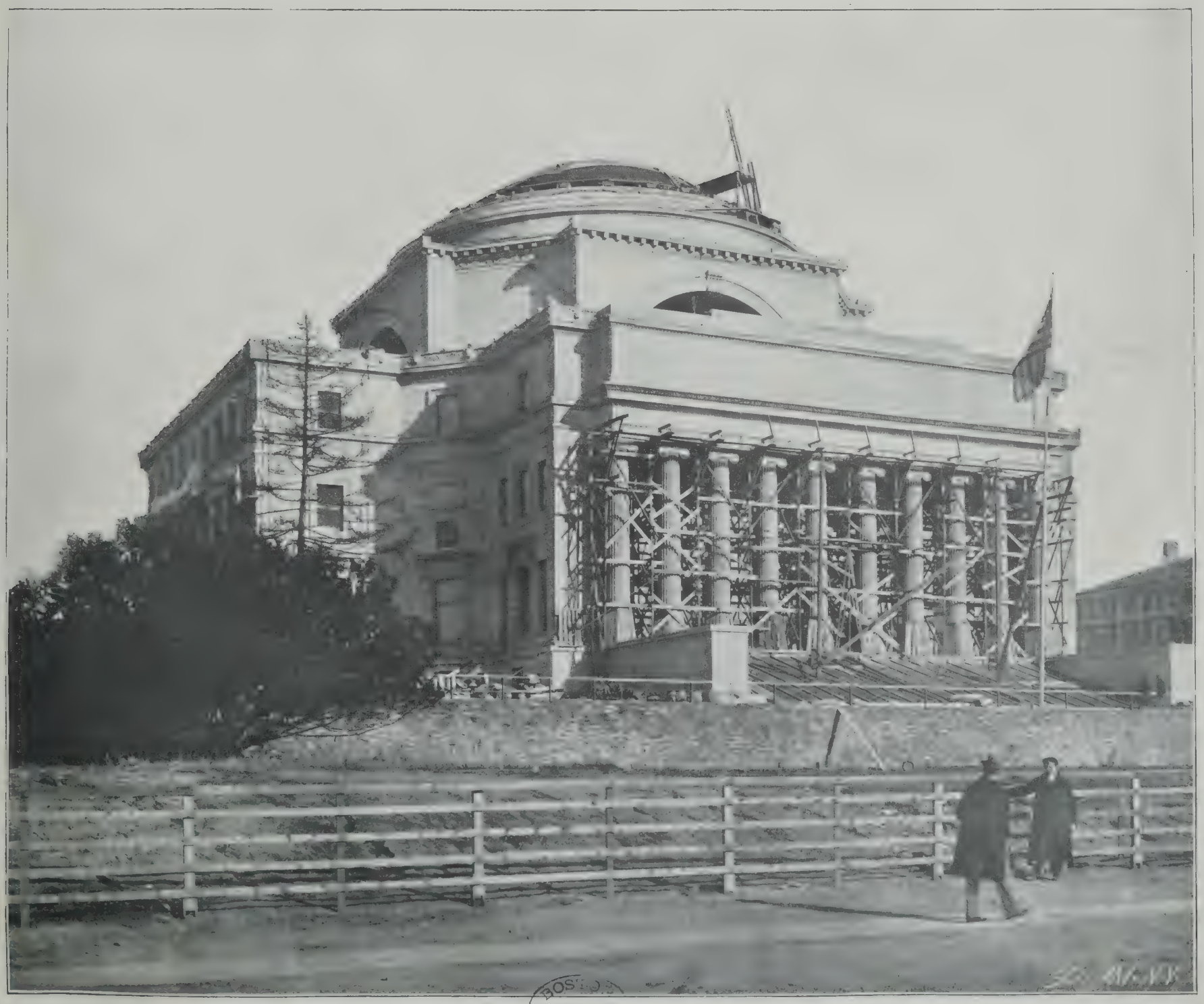

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NEW YORK, MARCH, 1897.

THE

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THE TWELFTH ANNUAL EXHIBITION OF THE ARCHITECTURAL LEAGUE OF NEW YORK.

The formal opening reception of the Twelfth Annual Exhibition of the Architectural League took place on Friday evening, February 19, in the American Fine Arts Society Building, West Fifty-seventh Street.

The Architectural League is an important agency for the advancement of the study and development of the fine arts, and includes among its members the foremost architects, artists, and sculptors in the country, the broad and practical field of the society especially covering the sister arts of architecture, sculpture, painting, and the applied arts. The existence of the society has created a rallying centre where all may meet upon one common platform, and it is by this means that the standard of work has been raised to its present level, and the popularity of the annual exhibitions increased.

One point upon which the League may justly pride itself is that it admits to its galleries the meritorious work of anybody irrespective of whether he or she is a member, and nothing is too large and grand, or too comparatively insignificant and commonplace, provided it have actual value, to be represented there. What finer opportunity could an artist have, who is struggling for recognition? There is even an invitation extended for the exhibition of English work, of which this year, for the first time, a considerable number of examples are hung. French art is also represented, for members of the League who have studied in Paris offer yearly a *Prix Américain* to the students of Ecole des Beaux Arts. This year the subject was a monument to Washington, and the prize drawing, awarded to Tony Gardiner, occupies a prominent place in the architectural gallery.

These annual exhibitions are held merely to give the public an idea of the advancement in architectural and decorative art work. The educational value of the exhibitions, therefore, is incalculable, and, indeed, this feature has always been an article of faith with the society, and the exhibitions are, first of all, of practical methods of work primarily for educational purposes.

If the visitor will bear in mind this thoroughly practical feature of the society, he will be better able to estimate the exhibition at its real value. It is not a collection of finished works, carefully prepared for exhibition purposes, but of sketches, studies, and fragments of detail gathered from the offices, studios, and workshops of the men and women engaged upon actual work, or in competition for it—hasty sketches, many of them, dashed off under the pressure of work, or while the idea was red-hot in the artist's brain, but, perhaps, all the more interesting on this account, since they let in a bit of light upon his methods.

The large South gallery contains the decorative exhibits, cartoons, stained glass, paintings for walls and ceilings, panel sketches, and mosaics. Among these are a number of drawings for decorations for the new Congressional Library, by Walter Shirlaw, G. R. Barse, Jr., E. H. Blashfield, Robert Reid, F. Dielman, W. L. Dodge, Elihu Vedder, and Kenyon Cox. These designs, as well as many others for public edifices, and those of the new silver certificates of the United States, by artists of rank, bear agreeable testimony to the fact, that at last there is a Governmental recognition of art achievement in public matters. In this gallery is also a model for bronze doors for the Congressional Library, by the late Olin L. Warner. Although he was not a member of the League, they have paid a tribute to the memory of so brilliant a sculptor, and have allowed space in the central alcove of the middle gallery for a very large number of his works, giving an opportunity to study his aims and methods which will no doubt receive the fullest appreciation. This alcove is devoted to sculpture, and there are many other fine specimens, besides clay models for andirons, candlesticks, and an electric light and font by H. Linder.

The east alcove is devoted to iron, brass, bronze, mosaic work, textiles, and stained glass, while the west alcove contains many fine specimens, including sketches and designs for furniture, friezes, and panels, for memorial statues, tablets, fountains, and articles of domestic use, also designs for posters, book covers, book plates, leather pointing, carved and burnt wood work, the latter making a very fine example for heraldic purposes. In this gallery is also a very fine specimen of machine tapestry, of original composition, after the manner of Boucher, by William Baumgarten, and also an Elizabethan chimney-piece in burnt wood, by J. W. Fosdick, in which, in place of brush and color, a heated steel is used, the lines being burnt into the wood. The result is a kind of bas-relief, worked in lovely shades of dark and light brown, and the effect is soft and delicate, yet clear cut and highly artistic.

The architectural (north) gallery is formed in alcoves, so that the hanging space is largely increased. This gallery contains elevations, plans, perspective drawings, detail work, plaster casts of porticoes, columns, capitals and cornices, as well as models of buildings as they are or will be.

Among the designs for large buildings is the new office building for the American Realty Company, at Rector street and Broadway, by U. B. Tuthill; the Astor building, of unusual proportions and excellent plan arrangement, by Clinton & Russell; the new building for L. C. Delmonico, which is one of the most attractive of the Renaissance style presented, by James Brown Lord, and the new proposed Herald Square Hotel, by Hill & Turner.

The list of country houses includes one for Mr. George Gould, of English style, very pronounced in its character; and a fine example for a modern country house, by Bruce Price. The latter illustrates the growing tendency to abandon the use of wood for the more durable brick and stone, exercising a sobering effect upon the profusion of details, while the freedom and unconventionality of the general designs are still a marked feature. A residence for James A. Garland, by Haydel & Shepard; a house at Tuxedo, by W. A. Bates; a country house for F. V. Burton, by Charles W. Romeyn, and an exceedingly classic design for Giraud Foster, Esq., at Lenox, Mass., by Carrère & Hastings, are among the other notable designs. The most novel and picturesque design presented is "Lueginsland," a studio erected for Carl Bitter, the celebrated sculptor, upon the edge of the Palisades, at Weehawken, N. J., and from designs by Frank E. Wallis.

A chaste and harmonious design is that of the entrance to the Church of St. Mary the Virgin, by N. Le Brun's Sons. At the east end of gallery is the accepted design for the memorial to Richard Hunt, the father of American architecture, by Bruce Price, artist, and Daniel C. French sculptor. The list is far from being exhaustive, but lack of space prevents further review. In previous years there have been few designs submitted by women, but this year at least fifty designs in architectural and artistic work have been submitted.

The League in order to encourage advancement and enthusiasm along architectural lines offer prizes in competition each year. This year the one for the cover to the catalogue was awarded to Claude Fayette Bragdon; the Avery prize to Egerton Swaitwout, and the tenth annual competition for the gold and silver medals to Harry Edward Prindle and Addison B. Le Boutillier, respectively.

Art has no nobler mission than to add grace and beauty to the severe lines of an office building, to embody the faith and worship of the congregations in our churches, to record the life-work of our worthiest citizens, or to bring its refining influences into the homes of rich and poor alike. These are some of the objects for which this society exists, and it is so excellent a one that it explains the enthusiasm of its members, and so far-reaching that they appeal to a large and growing public.

A RESIDENCE AT BRIDGEPORT, CONN.

We publish herewith in this issue, on page 40, a dwelling of unique construction and treatment, which has been recently erected for Enoch P. Hincks, Esq., on Golden Hill, at Bridgeport, Conn. The design is treated in a purely colonial style, with its square lines sufficiently broken by the swell bay-windows at front and side, and also the piazza, all of which add much to its appearance, yet keeping it within the simplicity of its outlines. The underpinning is built of rockfaced bluestone, while the superstructure is constructed of pressed buff bricks, with Berea Ohio stone trimmings. The roof is covered with octagonal cut green slate. Dimensions: Front, 48 ft.; side, 70 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft. 9 in.; second, 10 ft. 6 in.; third, 9 ft. The front vestibule is paved with tiles, and the walls are lined with brick. The main hall is trimmed with oak, and it has a paneled wainscoting, and an ornamental staircase made from a special design. Under this stairway a lavatory is provided. This floor and the remaining floors are laid with oak and highly polished. The drawing-room, spacious, is trimmed with white pine, and painted with china white, and it contains an open fireplace, trimmed with tiled hearth and facings, and a mantel of special design treated same as trim. The den is trimmed with sycamore, and it has a fireplace built of moulded brick, with similar hearth facings and mantel shelf. The library is trimmed with cherry, and it contains an open fireplace with red glazed brick tiling for hearth and facings, with bookcases built in at one side, and a cozy nook with seat at the other. The dining-room is another spacious apartment, and it is trimmed with oak. It has a paneled wainscoting. The butler's closet is trimmed with whitewood, and it contains dressers, drawers, cupboards, and sink, complete. The kitchen, pantry, and rear hall are trimmed and wainscoted with yellow pine, and are fitted up with the best modern conveniences. The hall on second floor is trimmed with ash. The two front rooms and dressing-room are trimmed with similar wood; the two bedrooms, over den, and dining-room are trimmed with pine and painted with china white, and the two rear bedrooms are trimmed with whitewood, and finished natural. The bathroom is trimmed and wainscoted with cherry; it has a cherry floor, porcelain fixtures, and exposed plumbing. The third floor contains an open hall, three bedrooms, and two trunk rooms. Cemented cellar contains furnace, laundry, vegetable cellar, store cellar, and other necessary apartments. Mr. Warren R. Briggs, architect, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken special[ly] SCIENTIFIC AMERICAN.

THE NEW LIBRARY BUILDING AT COLUMBIA UNIVERSITY, NEW YORK.

The engraving which we present on page 37 illustrates the new Library Building at Columbia University, New York. The land upon which this building is erected, together with the other buildings to be erected, comprises a little more than seventeen acres. It is divided naturally into two levels. The southerly level, or plateau, which is one hundred and fifty feet above high water, and includes about ten acres, is the higher, and varies in elevation from five to ten feet above the surrounding streets. The buildings in process of erection are being constructed chiefly upon the higher plateau, thus preserving a fine grove of oaks and chestnuts that adorn the northern portion of the grounds, and leaving space for future development. The buildings are arranged in a series of quadrangles, but with spacious openings on the streets and avenues. The library, the corner-stone of which was laid by President Seth Low, on the second of May last, and which is nearing its completion, forms the centre of the group, and is the nucleus of the plan, as it should be, of a modern university. Its proportions and design will render it one of the most commanding features of Morningside Heights. It stands upon a site which is the highest point in the plat, thus overtopping all other roofs, so that, from whatever direction it is viewed, the group of buildings swells up toward its dome. The main approach to the grounds is in the front of this building from 116th street, by a broad flight of steps and a court 375 feet in width by 200 feet in depth. Another flight of steps leads to the portico of the library. The façade of this building is a portico of ten lofty Ionic columns, rising up and supporting a classic entablature and pediment, and surmounted by a dome similar to that of the Pantheon. It is treated in a purely classic style of architecture, and is in the form of a Greek cross. Its details are in harmony with classic unity and simplicity in its general design, which will form one of the most noteworthy and beautiful buildings in America. The building is 192 feet square, and the height of the dome is 135 feet above grade line. The foundation is to rock-bottom, forty-five feet below grade line. One of the unusual features of this building worthy of note is that it is constructed of solid masonry from foundation to dome. This dome, which is 100 feet in diameter, is inclosed and roofed with stone which is so constructed as to support itself, there being no steel used in the construction of the building. The material used for exterior walls is Indiana limestone, resting upon a basement of Milford granite, of a pinkish gray in color, which is quite in harmony with the pale buff tone of the superstructure. The sub-basement contains heating and ventilating apparatus and storage room. The basement contains a large stock room, under reading-room, and superintendent's office. The main floor will be devoted to the administration and to several reading-rooms. The general reading-room will occupy the centre of the building, under the dome, which is lighted by four vast clerestory windows. It is eighty feet square, with a seating capacity for 225 readers. The Avery Architectural Library, the Law Library, and other collections will be placed in alcoves in the wings. Between the alcoves and the side windows will be spaces capable of being shut off by sliding partitions for private use of students. The interior has been most carefully planned, and 1,500,000 books can be ultimately accommodated with ease. The second floor contains President and staff rooms, and law lecture-room, while the third floor contains the lecture-rooms for philosophy and political science. The building is a memorial of Abiel Abbot Low, and is given by his son, Seth Low, Esq., the President of the University. It was designed by Mr. Charles F. McKim, of the firm of McKim, Mead & White, architects, 160 Fifth Avenue, New York.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A PHYSICIAN'S RESIDENCE AT CHEVY CHASE, MD.

We illustrate, on page 41, the residence and office of Dr. Wm. Penn Compton, on Kirk Street, Chevy Cha[illegible] Md. It is a simple but impressive design of rough ston[illegible] shingles, and plaster. Roof is shingled, stained red, pleasantly contrasting with the light gray plaster at side and dark gray stone of first story, assisted by the mottl[illegible]

LODGE AND GATE FOR A CEMETERY.

LODGE AND GATE FOR A CEMETERY.

We present on this page a design for a lodge and gate, which has recently been erected for a new cemetery at New Shoreham, Sussex, England, and from the designs of Mr. Arthur Loader, architect, of Brighton. It is situated upon a very picturesque site on the main road, above Southampton Road, leading from the parish of New Shoreham into Old Shoreham. The design is unique in its detail, in harmony with its surroundings, and is treated in the English-Gothic style of architecture, with half timber and brick walls on the exterior. It is constructed of hard picked red kiln bricks, and large band flints, with all the joints struck and raised in cement, with pleasing effect. The timber part of the construction is built of wrought English oak. The roofs are covered with red tiles, adding much to the general effect and beauty of the design.—*London Architect.*

A RESIDENCE AT STAMFORD, CONN.

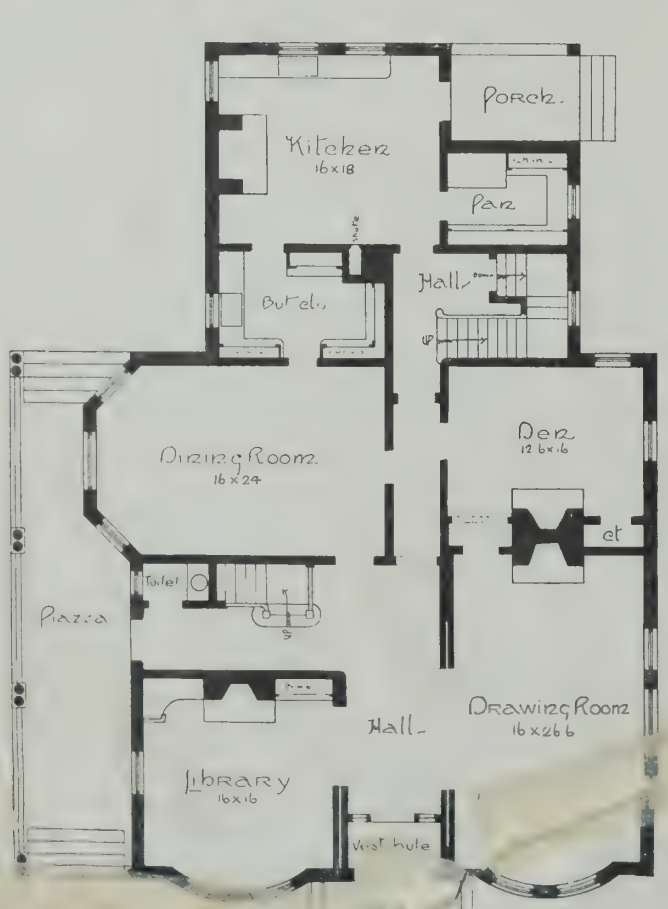
The illustrations shown herewith, on pages 44 and 45, present the residence of Frederick W. Lockwood, Esq., at Strawberry Hill, Stamford, Conn. The design is very attractive and pleasing in its execution, and it presents many excellent features. It is constructed of the best combination of materials and first-class workmanship. The plans show many bay windows throughout, and an abundance of piazza room. The first story is built of local bowlders, laid up at random, with pleasing effect, while the second story, of wood, is covered on the exterior with shingles. The roof is shingled, and finished natural. The chimneys are built of Roman brick. Dimensions: Front, 91 ft.; side, 53 ft., not including [illegible]. Height of ceilings: Cellar, 8 ft.; first story, [illegible]ond, 9 ft. 6 in.; third, 9 ft. The entrance is [illegible]e-cochère, with its circular stone columns, [illegible] leading to vestibule, which is separated [illegible]per by an archway. This hall is a grand, spacious, and open one, and it is trimmed with quartered oak. It has a paneled wainscoting, rising to within eight inches of wood cornice, and a heavily beamed ceiling, forming panels, which are also filled in with paneled work. The staircase is a neat, ornamental one, with a broad landing at second story, and it has also a paneled seat. A view, which we present herewith, looking from drawing-room, through hall, into dining-room, presents the staircase in detail. The reception room, at the left of entrance, is treated with ivory white and gold in a most artistic manner, and with excellent effect. The drawing-room is trimmed with quartered oak, and it has a wall paneled with oak, and a ceiling beamed and paneled. The massive, open fireplace is built of Roman brick, with hearth and facings of same, a mantel shelf and an overshelf, supported upon massive oak columns, with carved capitals. The circular projection is fitted up with paneled seats. The dining-room is trimmed with quartered oak, and it has also a paneled wall and ceiling, and a fireplace trimmed with wrought iron, Roman brick, and mantel shelf, with carved panels. The buffet is built in, and is handsomely carved. The floors are laid with oak, and highly polished. The rear hall, toilet, pantries, linen closet, and kitchen are trimmed and wainscoted with white pine, and each apartment is furnished with the best modern fixtures and conveniences complete. The kitchen has an ice-box built in at rear entrance. The toilet, conveniently located, is fitted up with the usual fixtures and exposed plumbing. The second floor is trimmed with white pine, some of which is stained, while the remainder is treated in colors. This floor contains seven bedrooms, two dressing rooms, two bathrooms, and many large closets. The bathrooms are wainscoted, and are furnished with Mott's fixtures and exposed nickelplated plumbing. The third floor contains five bedrooms and bathroom, besides ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Approximate cost, $22,000. Mr. W. W. Kent, of Jardine, Kent & Jardine, architect, 1262 Broadway, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT BRIDGEPORT, CONN.

We present as a subject for our colored plate in this issue, and on page 47, a cottage recently erected for Charles T. Beardsley, Esq., at Bridgeport, Conn. The illustrations show a very interesting design, with a combination of pleasing elevations and well arranged plans. The interior is handsomely finished. It is constructed of the best material, and the workmanship is first class. The underpinning is built of brick. The superstructure, of wood, is covered with clapboards on the first and second story exterior, while the gables are covered with shingles. The whole is painted colonial yellow, with white trimmings. The roof is shingled, and painted red. The blinds are painted bottle green. Dimensions: Front, 32 ft. 6 in.; side, 30 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with whitewood. Hall finished natural. This hall contains an ornamental staircase, with handsomely turned newel posts, balusters, and rail. The parlor is treated with china white in a dainty manner, and it has a neat mantel and a false fireplace; the mantel is relieved by being touched up with gold. The dining-room has a circular projection at one end, with a cluster of five windows, giving ample light and ventilation. This room is filled and finished natural. The kitchen and pantry are trimmed and wainscoted with North Carolina pine and finished natural. The second floor contains three bedrooms, four closets, and bathroom. The bedrooms are treated in delicate colors. The bathroom is wainscoted with North Carolina pine, and is provided with the usual fixtures and exposed plumbing. The third floor contains [illegible] servant's bedroom, two trunkrooms, and a large, open attic. Cemented cellar contains furnace, laundry, and all necessary apartments. A duplicate house, similar to this, was built for $2,650, complete. Mr. Charles T. Beardsley, architect, Bridgeport Savings Bank Building, Bridgeport, Conn.

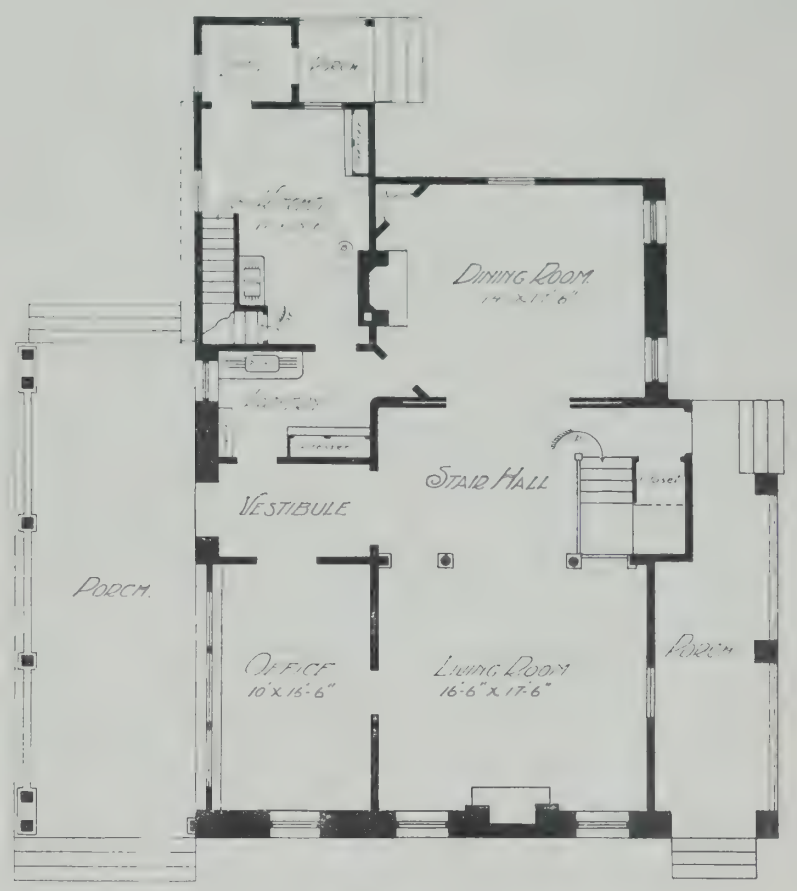
Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.



First Floor

Second Floor.

A RESIDENCE AT BRIDGEPORT, CO[illegible]38.

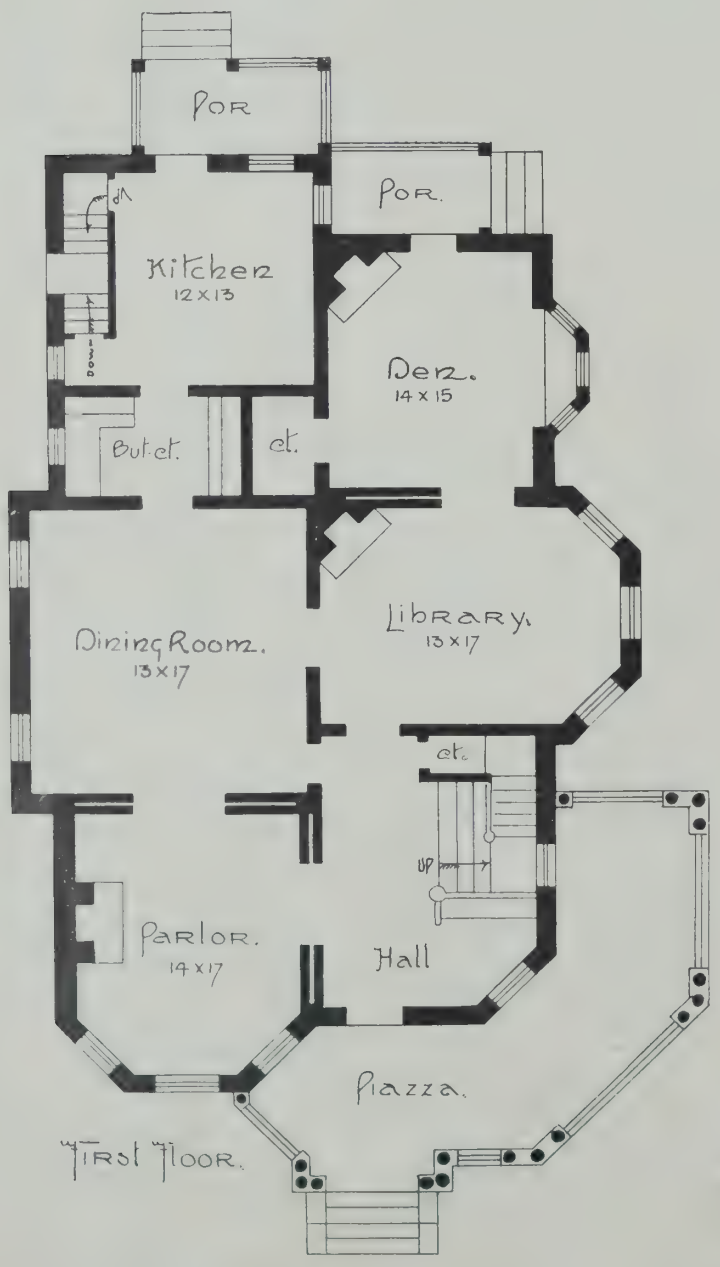


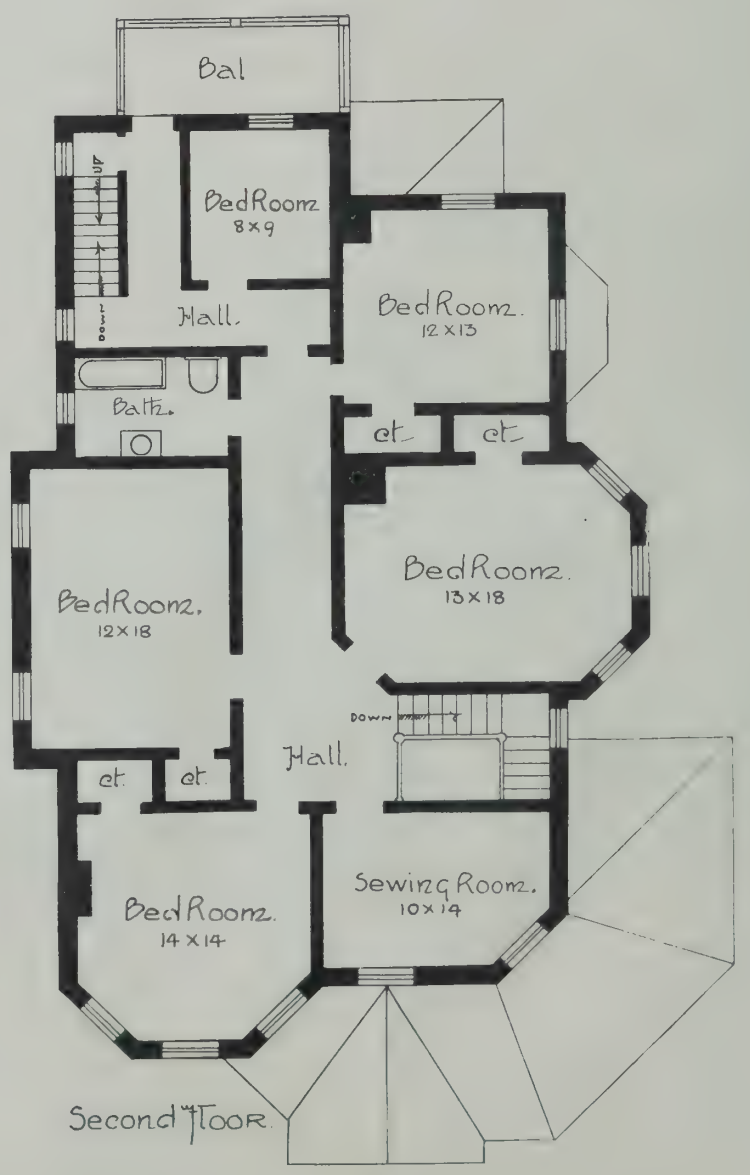
FIRST STORY

SECOND STORY

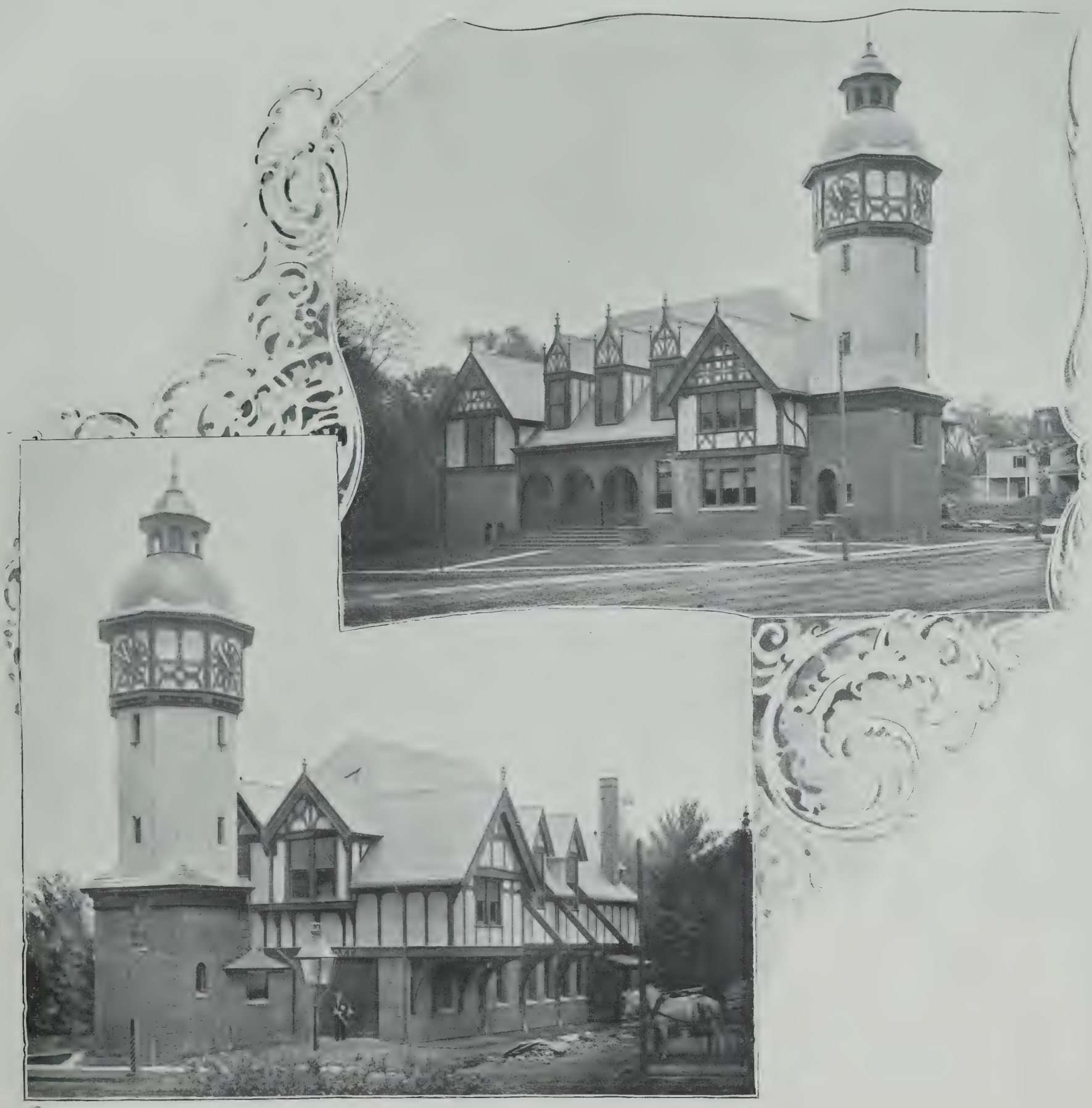
BOSTON PUBLIC LIBRARY

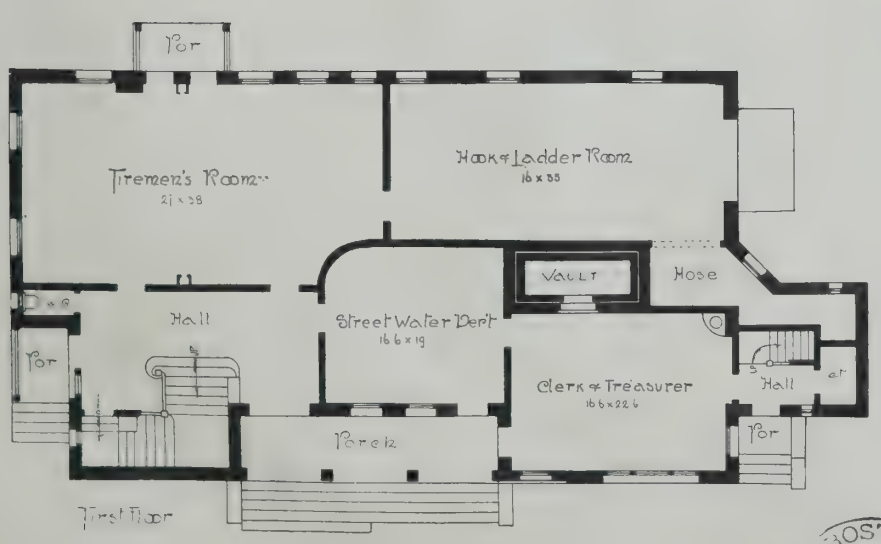
A PHYSICIAN'S RESIDENCE AT CHEVY CHASE, MD.—See page 39.

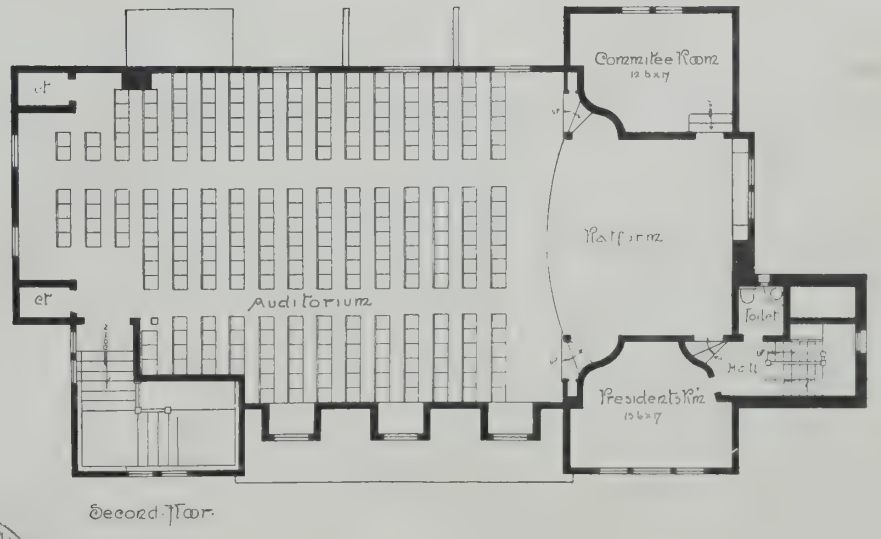




A MODERN DWELLING AT WILLIAMSPORT, PA.—See page 52.

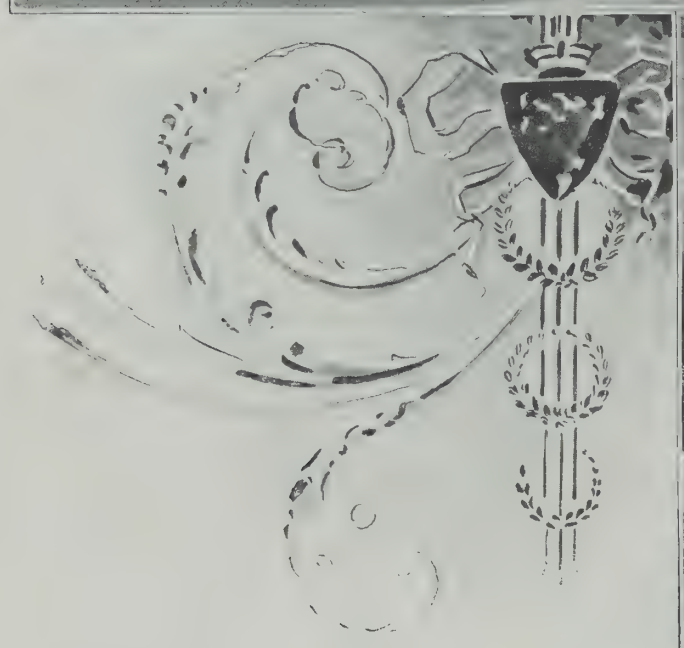






BOSTON PUBLIC LIBRARY

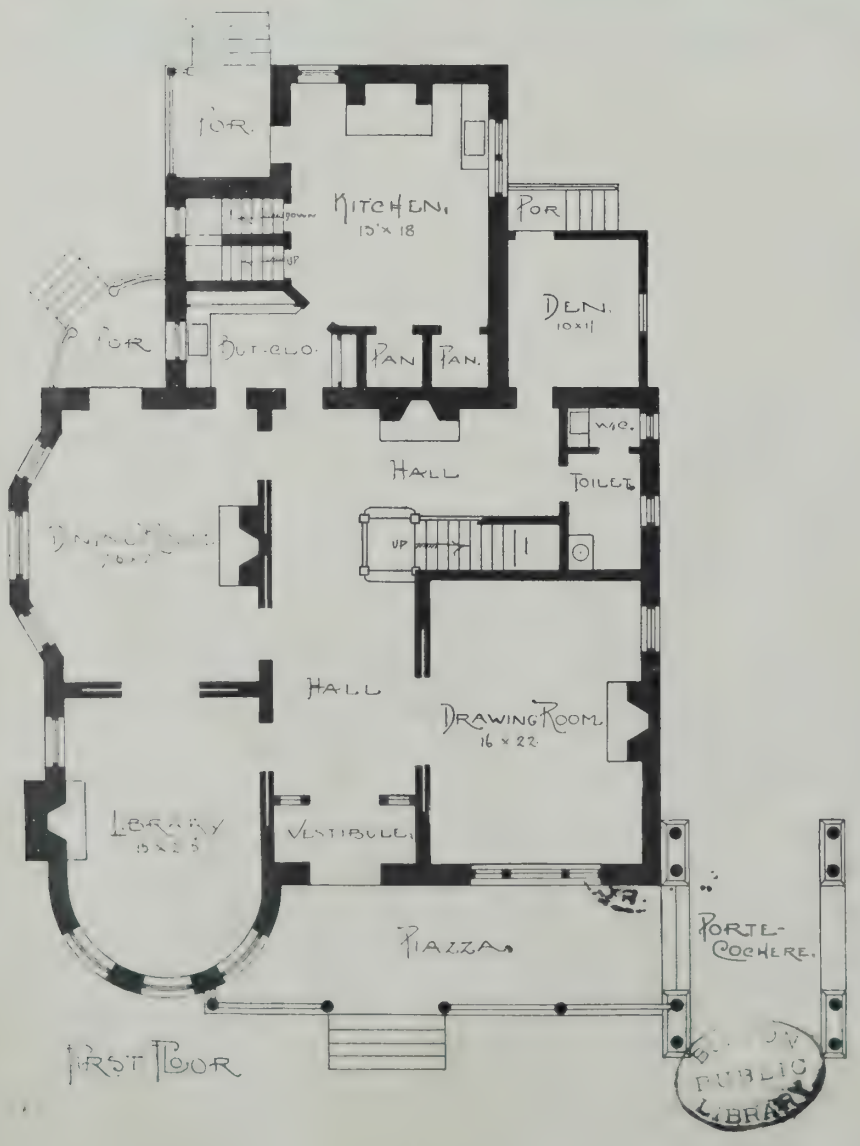
SOUTH ORANGE VILLAGE HALL.—See page 52.



A RESIDENCE AT STAMFORD, CONN.—See page 39.

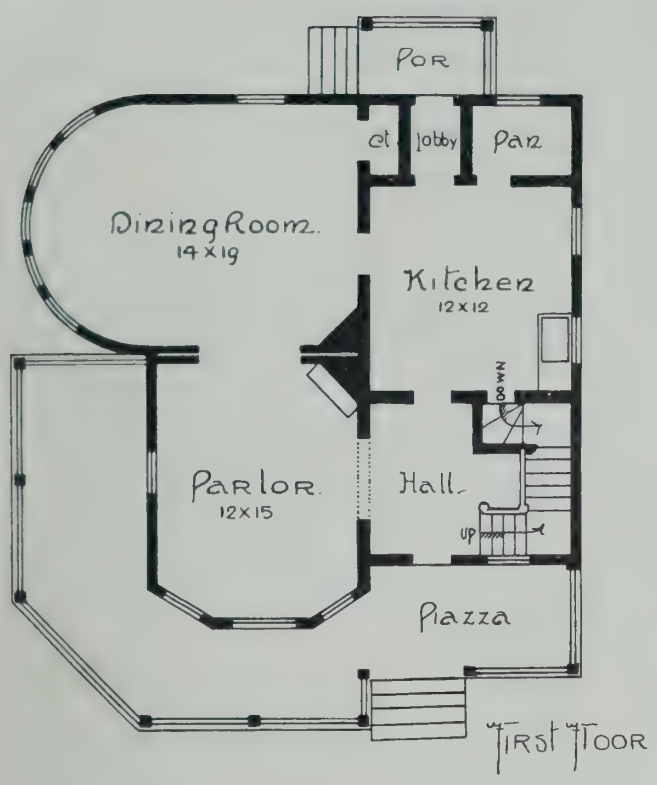
N.Y. PUBLIC LIBRARY

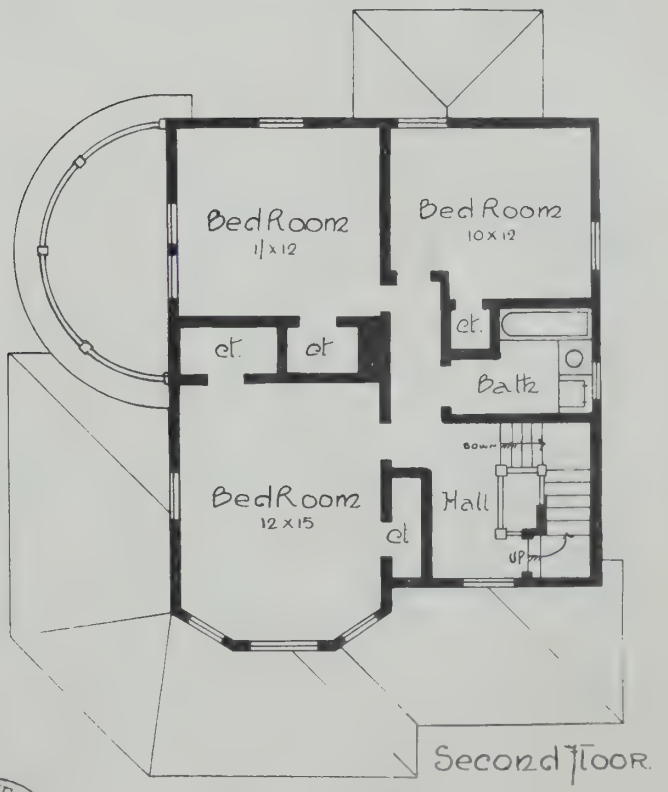
A RESIDENCE AT STAMFORD, CONN.—See page 39.



PUBLIC LIBRARY

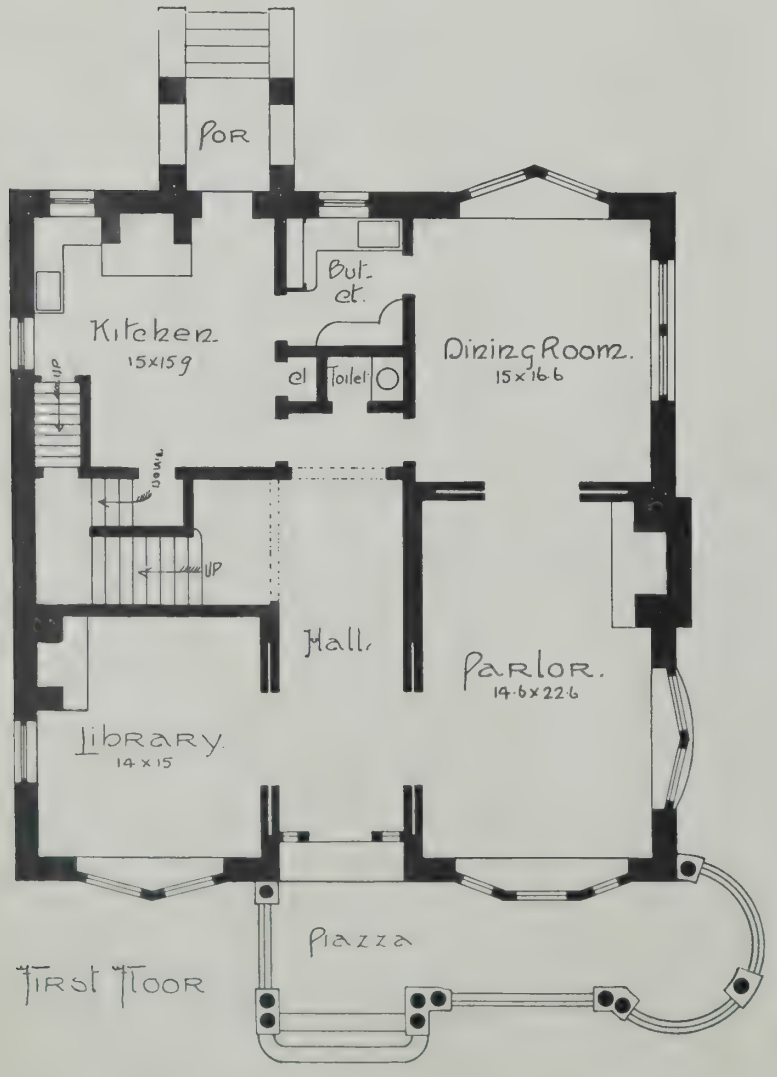
A RESIDENCE AT MONTCLAIR, N. J.—See page 52.





BOSTON PUBLIC LIBRARY

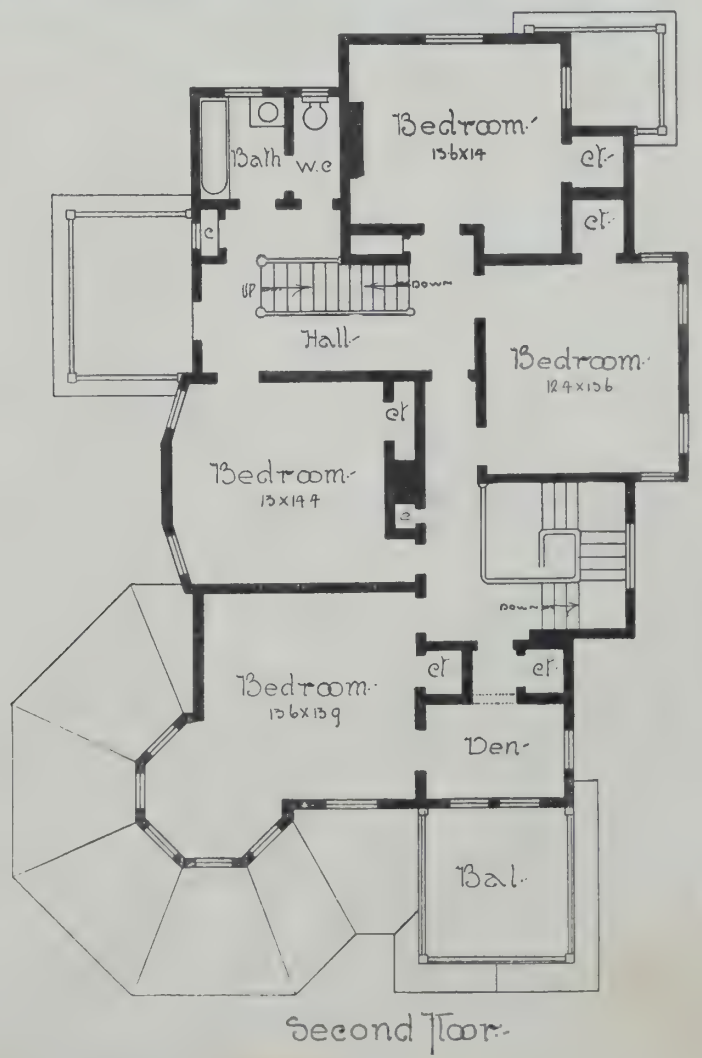
A COTTAGE AT BRIDGEPORT, CONN.—See page 39.



LIBRARY

A RUSTIC STONE DWELLING AT CRANFORD, N. J.—See page 52.

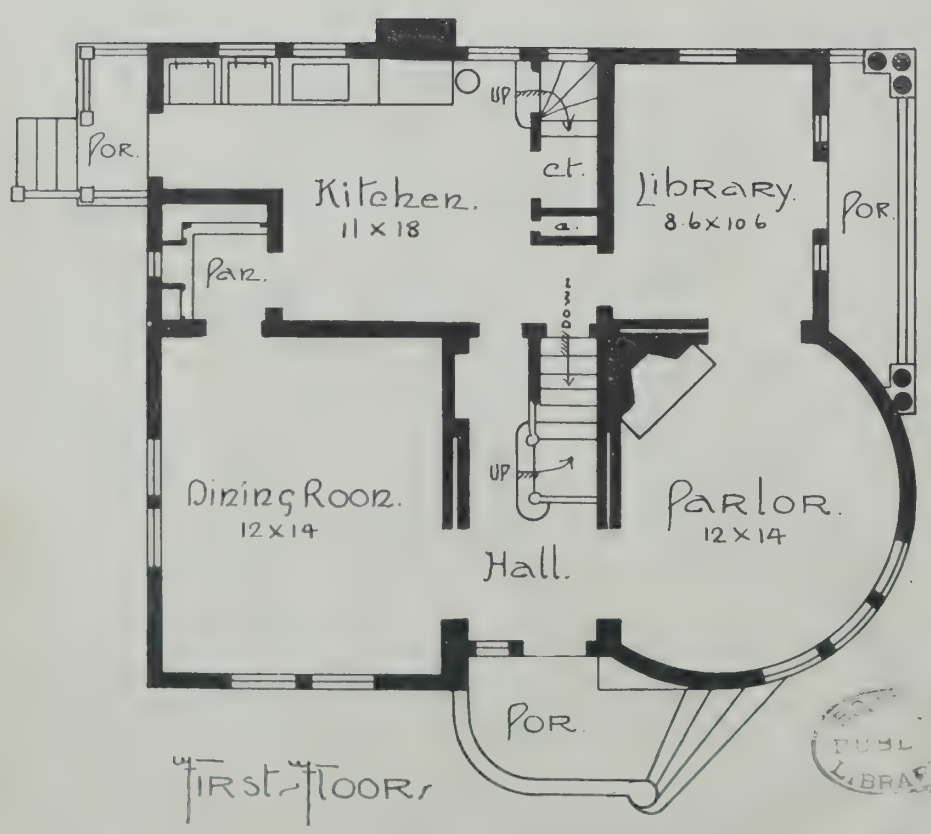
First Floor.

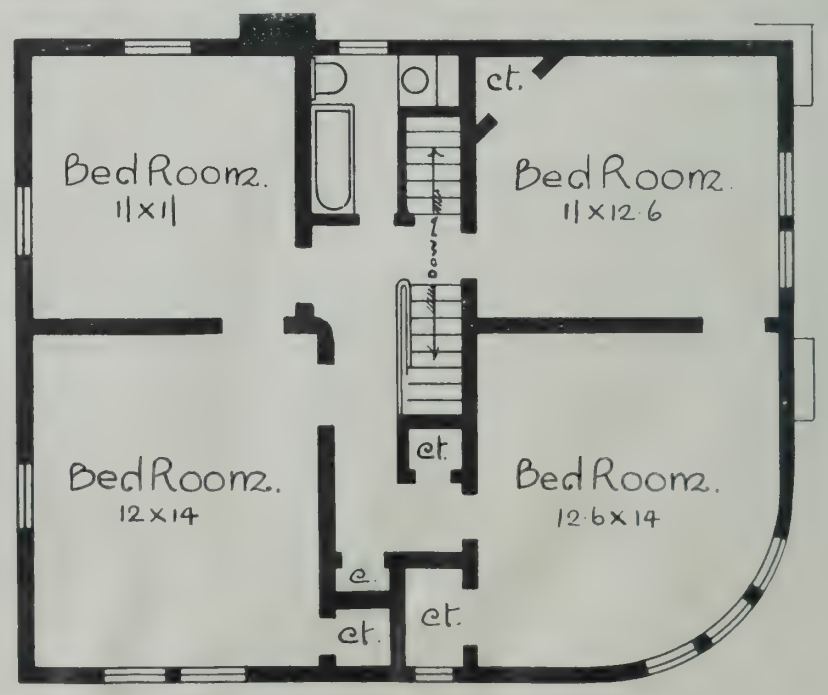


Second Floor.

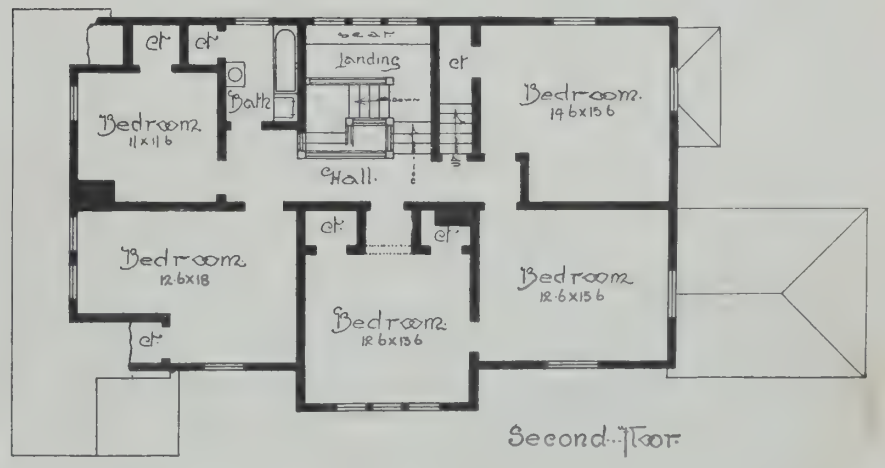
BOSTON PUBLIC LIBRARY

A RESIDENCE AT NEW HAVEN, CONN.—See page 52.





A MODEL SUBURBAN COTTAGE AT CLINTON TOWNSHIP, N. J.—See page 52.



A SUBURBAN HOUSE AT MOUNTAIN STATION, N. J.—See page 52.

A RUSTIC STONE DWELLING AT CRANFORD, N. J.

We present herewith in this issue, on page 48, a dwelling recently erected for Alden B. Bigelow, Esq., at Cranford, N. J. The engraving presents a design with pleasing elevations, many good features, and a well arranged plan, furnished with all the best modern conveniences. The construction is of the very best, and the workmanship first class. The exterior walls are built of rustic stone brought from the Schooley Mountains, and laid up at random. These stones are covered with a thick enamel of a bluish gray color, and they are laid up at random as they are found with this enamel incrusted upon them. This wall is 18 in. thick and is laid up in black mortar. It is lined on the inside with brick. The balustrade at piazza is painted ivory white, and the columns are finished natural with hard oil. The roof is covered with tongued sheathing and then with two thicknesses of waterproof paper, and finally with Bangor black slate. The gutters and flashings are of copper, and the leaders are of galvanized iron. Dimensions: Front, 41 ft. 6 in.; side, 43 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft. 2 in.; first story, 9 ft. 6 in.; second, 9 ft.; third, 10 ft. The entrance is through a massive door, with windows on either side glazed with plate and chipped glass with exquisite effect. The interior throughout is trimmed with white pine treated with white shellac, leaving it with satinwood effect. The hall, broad and spacious, contains an ornamental staircase, wainscoted in panels, with turned newels and balusters, and a window glazed with glass similar to entrance windows. The parlor is treated in ivory white, and it contains a bay window thrown out with flower-shelf, and an open fireplace trimmed with tiled hearth and facings, and a mantel of ash with columns and mirror. The library is provided with a Jackson ventilating grate (heating two stories), with the usual tiled hearth and facings, and mantel of oak, carved and provided with columns and mirror. The dining-room is wainscoted with Japnaese paper in relief. This room is connected with kitchen through butler's closet, which is fitted up with the best modern fixtures, drawers, shelves, bowls and closets complete. Kitchen is wainscoted with yellow pine, and contains the "Perfect" range and all the usual fixtures. The floors in this story are double, and the top layer is laid with ash. The second floor contains four bedrooms, six closets and bathroom; the latter wainscoted with North Carolina pine and fitted up with porcelain fixtures and exposed nickelplated plumbing. The floors on this story are also double, and the top layer is yellow pine. The third floor contains two bedrooms and billiard room. Cemented cellar contains laundry, a Thatcher furnace, coal cellars and vegetable cellar. Plate glass windows throughout. Mr. J. A. Oakley, architect, Elizabeth, N. J.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A RESIDENCE AT NEW HAVEN, CONN.

We publish on page 49 a very unique design for a residence which has been recently erected for Frank Brazos, Esq., at New Haven, Conn. The building has many excellent features, including a spacious piazza, porches, balconies, bay windows, and tower. The underpinning is built of rockfaced bluestone. The brickwork at piazza and chimneys are built of buff brick. The exterior framework is covered with sheathing laid on diagonally. This sheathing is covered with paper and then clapboarded with narrow, beveled clapboards, and painted a silver gray with grayish-brown trimmings. The gables are shingled and painted similar. The roof is covered with octagonal cut slates. Dimensions: Front, 35 ft. 6 in.; side, 50 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second story, 9 ft.; third story, 8 ft. 6 in. The vestibule has a mosaic tiled floor and is paneled in oak. Hall is trimmed with oak. It has a paneled wainscoting and a ribbed ceiling. The hall and staircase hall are separated by an archway furnished with a spindle transom. The staircase is an elaborate one, elegantly carved, and is lighted effectively by a stained glass window, which sheds a soft and pleasant light over upper and lower halls. The parlor and library are trimmed with sycamore and finished natural; the latter is provided with open fireplace furnished with tiles and a hardwood mantel made from a special design. The dining-room is trimmed with quartered oak. It has a paneled wainscoting and a china cabinet built in with leaded glass doors. The office and rear hall and stairway are trimmed with yellow pine and are conveniently located. Kitchen and pantry are trimmed and wainscoted with similar wood, and fitted up replete. The second floor is trimmed with whitewood and finished natural. It contains four bedrooms, den and bathroom; the latter is wainscoted and furnished with the usual fixtures complete; exposed nickelplated plumbing. Third floor contains three bedrooms, trunkroom and storage. Cemented cellar contains furnace, laundry and other apartments. Cost, $6,800, including steam heat and everything complete. Messrs. Stilson & Brown, architects, New Haven, Conn.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODERN DWELLING AT WILLIAMSPORT, PA.

We present herewith in this issue, on page 42, a modern dwelling recently erected for Mr. Horace Hanks, at Williamsport, Pa. The engravings illustrate a handsome design for a modern dwelling, and the plans present an excellent interior arrangement. The underpinning is built of native rockfaced bluestone. The other stonework where shown is constructed of similar stone. The walls of the superstructure are built of Trenton pressed brick, laid up in red mortar. The gables are covered with red cedar shingles. The roof is covered with slate. Dimensions: Front, 40 ft.; side, 60 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft 6 in. The first floor is trimmed with red oak, and treated with a dead finish. The hall contains an ornamental staircase, with balusters, carved newel posts, and a paneled seat. The first landing is provided with a stained glass window, with good effect. The parlor, dining-room, library, and den are all connected, and the open fireplaces shown therein are trimmed with tiled hearth and facings, and mantels, carved, and of excellent design. The kitchen and pantries are trimmed and wainscoted with yellow pine, finished natural, and are furnished with the best modern conveniences. The second floor is trimmed with quartered oak, and it contains five bedrooms, sewing-room, large closets, and bathroom; the latter is wainscoted with oak, and fitted up with porcelain fixtures and exposed plumbing. Third floor contains bedrooms and ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $6,000, complete. Mr. David K. Dean, architect, Williamsport, Pa.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

SOUTH ORANGE VILLAGE HALL.

We present herewith in this issue, on page 43, the new Village Hall which has recently been erected at South Orange, N. J. The design is excellent, and it has a complete arrangement. It is treated in the Gothic style of architecture. The building not only includes the offices of the clerk, treasurer, and street water department, but it also provides room for the fire department, and the town hall on second floor. The underpinning and first story are built of mottled burned brick with rough faces The second story is beamed in half-timbered fashion, forming panels, which are filled in with plaster work. The trimmings and beams are painted bottle green. The dormers and gables are treated in an artistic manner. The whole building is surmounted by a massive tower, which is built in a similar manner, and is provided with the town clock; the roof is covered with octagonal cut slates. The main halls and officers' rooms are trimmed and wainscoted with oak. The broad, low staircase is provided with a massive carved newel post; this stairway leads to second floor, containing the auditorium with a seating capacity of three hundred, a platform for the town council committee, president, and toilet rooms. These apartments are trimmed and wainscoted with yellow pine, and finished natural; the doors are of black walnut. The fire department is fitted up complete, and is provided with all the best modern improvements. The cellar contains furnace and storage room. The total cost was $12,500, and it included the building proper, $10,694; bell in tower, $350; clock in tower, $300; and the fireproof vault, which cost $350. It is considered a phenomenal result for the expenditure, and one reason for this is, the fact that there was no competition, as it was placed by the board of directors into the hands of Messrs. Rossiter & Wright, architects, 94 Liberty Street, New York. The building was completed through the untiring efforts of its president, Mr. Eugene V. Connett, and the board of directors.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A RESIDENCE AT MONTCLAIR, N. J.

The engravings and floor plans, on page 46, present a residence recently completed for F. J. Dresher, Esq., at Montclair, N. J. The underpinning and first story are of red sandstone. The second and third stories are built of wood, and are covered on the exterior with clapboards and painted a yellowish green with darker trimmings. Roof is slated. Dimensions: Front, 50 ft.; side, 72 ft., exclusive of piazza and porte-cochère. Height of ceilings: Cellar, 8 ft.; first story, 11 ft. 6 in.; second, 9 ft. 6 in.; third, 9 ft. Vestibule is paneled with oak and has a tiled floor laid in mosaic. Hall is trimmed with quartered oak. It has an oak floor, paneled wainscoting, and an open fireplace with tiled brick facings and hearth, and a Dutch mantel of excellent design. The broad, low staircase is an ornamental one with carved newel posts, and is well lighted by a magnificent stained glass window representing the Good Shepherd. The toilet is conveniently located and fitted up replete. Drawing-room is treated with china white and gold in a most exquisite manner. It has an open fireplace, with hearth and facings of Mexican onyx and an elaborately carved mantel with mirror. Library is trimmed with black walnut. It has a floor of walnut and oak, bookcases built in, and a fireplace fitted up in a first-class manner. Dining-room is a very handsome apartment and it is trimmed with antique oak. It has a paneled wainscoting, a hardwood cornice, oak floor, stained glass buffet window and a fireplace with tiled hearth and facings, wrought iron trimmings and a massive carved mantel with columns and mirror. Den is trimmed with oak, and it has an outside entrance thereto. Butler's pantry and kitchen are trimmed and wainscoted with yellow pine and finished natural; the former is furnished with bowl, cupboards, drawers and shelves inclosed with glass doors. Kitchen is provided with the usual pantries and fixtures complete. The second and third floors are trimmed with sycamore. The second floor contains five bedrooms, dressing-room, bathroom, linen, cedar and other closets. The bathroom is paved with Italian marble, wainscoted with cherry, and furnished with the usual fixtures and exposed plumbing. Third floor contains billiard room, three guest chambers, trunkroom and three servant bedrooms. The cemented cellar contains laundry, furnace, cold storage room and other necessary apartments. The cellar partitions are built of brick. Mr. Paul G. Botticher, architect, Newark, N. J.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A SUBURBAN HOUSE.

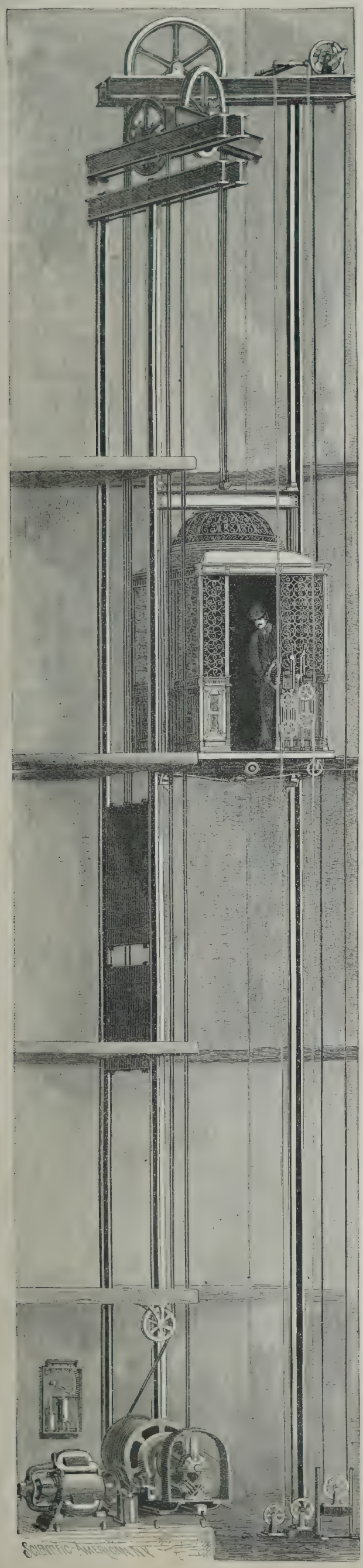
We publish herewith in this issue, on page 51, a suburban house, recently completed for Robert Maxwell, Esq., at Mountain Station, N. J. The design has several good features, and is built in a substantial manner with good materials and workmanship. The underpinning is built of local brick, laid up in red mortar. The exterior frame work is sheathed, and then covered with shingles, and left to weather finish a natural silvery gray color. The trimmings are painted white and the blinds light gray. Roof shingled and finished natural. Dimensions: Front, 64 ft.; side, 28 ft. 6 in.; not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft.; second, 8 ft.; third, 7 ft. 6 in. The hall is trimmed with oak, and is furnished very handsomely with a paneled wainscoting and a massive wood cornice. The nook is a pleasing feature, with paneled divan, and fireplace with tiled trimming and mantel extending to ceiling. The oak girders, which divide this nook, are supported on pilasters and columns with carved capitals. The staircase is a handsome one, with newel posts extending to ceiling, and forming an arcaded effect. The main landing is provided with a window seat. Parlor is treated with ivory white in a delicate manner, and it is fitted up with fireplace, with white enameled tiling and mantel of exquisite design. Dining-room is trimmed with oak, and it has a paneled seat in bay-window and an open fireplace. Butler's closet and kitchen are trimmed and wainscoted with yellow pine, finished natural, and furnished complete. The second floor is trimmed with whitewood, and it contains five bedrooms, closets, and bathroom; the latter is wainscoted and fitted up complete. Third floor contains three bedrooms and trunk room. Cemented cellar is provided with laundry, furnace, and other necessary apartments. Mr. Edward T. Hapgood, architect, Hartford, Conn.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODEL SUBURBAN COTTAGE AT CLINTON TOWNSHIP, N. J.

We present on page 50, in this issue, a model suburban cottage, which has been erected for Charles F. Lewis, Esq., at Clinton Township, Newark, N. J. The design is an exceptionally fine one for a dwelling of so low a cost, and it combines both pleasing and attractive elevations, well designed and executed, together with a well arranged plan containing all the modern conveniences. The underpinning is built of brick, laid up with red mortar in a neat manner. The superstructure of wood is covered on first story with clapboards, and painted white; the second story and gables are covered with shingles, and painted Indian red, with white trimmings. The roof is shingled and finished natural. Dimensions: Front, 32 ft.; side, 26 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 8 ft. 6 in; second, 8 ft. 6 in.; third, 7 ft. The interior throughout is trimmed with cypress, treated natural. The door and window casings have mouldings of neat design. The floors are of yellow pine. The entrance is provided with a Dutch door. The hall contains an ornamental staircase turned out of ash, and a nook for hat rack. The parlor is fitted up with a false fireplace, with tiled hearth and facings, and a mantel of excellent design, treated in white and gold. The library is a unique little apartment, with door opening on to a private porch. Dining-room, well lighted, has a pantry providing an entrance to kitchen, and containing drawers, shelves, and cupboards. The kitchen is provided with closets, sink, washtrays, and stairs to cellar. The second floor contains four bedrooms, five closets, and bathroom; the latter wainscoted and fitted up with the usual fixtures. Third floor contains ample storage. Access to this floor is had by a ladder leading to a trap door. Cemented cellar contains furnace and other apartments. Cost, $3,000, complete. Mr. C. Frederick Bertrand, architect, 739 Broad Street, Newark, N. J.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.



ELECTRIC ELEVATOR FOR FIREPROOF BUILDINGS.

THE LATEST IMPROVEMENTS IN ELECTRIC ELEVATORS.

The adaptation of electricity to the working of elevators in buildings has been watched with great interest, and the fact that electric elevators are now achieving a marked degree of success, and coming largely into use, is looked upon with great favor by the public. The large illustration on this page shows a high grade electric passenger elevator for fireproof buildings, the only combustible material used in it being the floor of the car. The motor is anchored to a brick foundation in the basement, and takes up but little space. This class of machine is built by the Elektron Manufacturing Company, in sizes ranging from 5 horse-power to 20 horse-power, for speeds ranging from 40 feet per minute to 200 feet per minute, and for capacities from 2,000 pounds to 5,000 pounds. In the small illustration is shown a machine for speeds ranging from 10 feet per minute to 100 feet per minute, and capacities from 10 pounds to 500 pounds, while still smaller and larger machines are made.

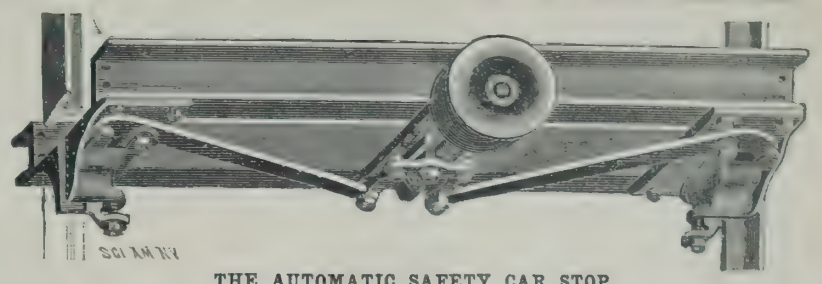
These elevator machines are of the "worm gear" class, by perfecting the design and workmanship of which high efficiency and smooth running have been secured, the efficiency of the passenger gears being proved to be over 75 per cent. The drum, gearing, motor and switch are all mounted on one heavy cast-iron bed plate. The gear is of gun metal, with teeth accurately hobbed from the solid, and the worm and worm shaft are made from one steel forging accurately turned in the lathe. Both gear and worm run in an oiltight case or housing, which also contains the bearings. The electric motor is coupled direct to the worm shaft by a heavy insulated coupling, which also serves as a brake wheel. The motors are constructed especially for elevator work, having great starting power, high efficiency and durability. They are heavily insulated from all other parts of the machine, thus obviating all danger of a shock to the operator in the car.

The plant illustrated is what is known as a "six cable job," there being two wire cables from the winding machine to the car; two from the car to the car counterweight, and two from the machine to the machine counterweight. By this means it is possible to "overbalance the car," and it is found that the best practice is to overbalance equal to the average load.

The sheaves over which the cables run at the head of hoistway are of cast iron, with steel shafts running in babbitted self-oiling bearings. These bearings are supported by heavy steel beams, which are in turn supported on the walls of the building. The guides for the car and counterweight are of planed tee iron, with fish plates at the joints, making a perfectly smooth and straight track for the car. The frame of the car is composed wholly of steel channel beams. The cables and safety devices are all attached to this frame, relieving the car of all strain. The car itself sits upon the two bottom beams of the frame, and is strongly braced to the side beams. The car, as will be seen, is of highly ornamental iron work, and is usually provided with electric light chandelier and with electric annunciator connected to call buttons at each landing.

As shown in the illustration, the control of the car is by hand wheel, but where preferred on moderate speed elevators the straight hand rope is used. The starting, stopping and reversing are accomplished with the greatest ease and smoothness. The switch, which is shown mounted on the operating sheave at one end of the drum, is very substantial, and, being mounted on a large radius, moves very rapidly as compared with the movement of the operator's hand; it also breaks contact with a pronounced snap. Troubles with the burning of switch contacts have in this apparatus been entirely avoided. The automatic rheostat is shown attached to the wall back of the machine, and insures a smooth start and prevents blowing fuses, no matter how suddenly the operator may throw in the switch.

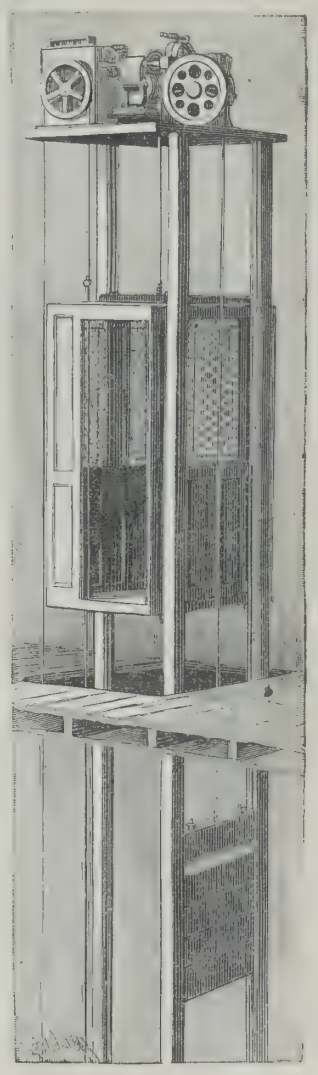
In the construction of the passenger elevator, the question of safety has justly received the first consideration What may be styled the "car safeties" are shown in the large illustration, and also in detail at the bottom of car. An endless rope passes over the governor wheel, which is located on the overhead beams, around an idler wheel at the bottom of the hoistway, and several times around the safety drum on the car. This rope is, by a spring pressure, caused to move normally with the car. In case of the breakage of the lifting ropes, or in case of excessive speed due to any cause, the centrifugal governor operates a clutch which stops the movement of the rope. As the car continues to descend, the safety drum is caused to revolve, applying a gradually increasing vise grip to the steel guide rails on either side and bringing the car to a gradual stop. The machine also has a complete line of safety devices, as shown in the illustration of the switch and brake mechanism, where may be seen the attachment of the two switch knives directly to the operating sheave. This sheave is loose on the drum shaft, and is rotated by the wire rope from the car at the will of the operator. The inner hub of the sheave carries a cam which moves the bell crank lever, raising and lowering the lever of the brake, and the instant the switch knives break contact with the clips the brake is applied.



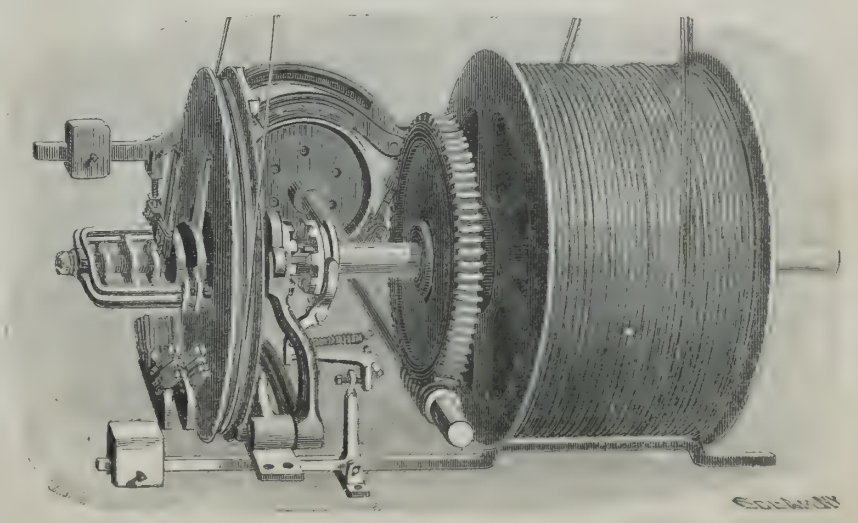
THE AUTOMATIC SAFETY CAR STOP.

One of the most important "safeties" is what is called the slack cable safety, also shown in the same view. A bar is located just below the drum and so close to it that there is barely room for the cables to run between when they are taut. If for any reason the cables should become slack, the bar is tipped downward, tripping a catch and allowing the coil spring to slide forward a clutch on the drum shaft into connection with the operating sheave. A slight additional rotation of drum will carry the sheave sufficiently to open switch and apply brake and stop the machine.

The automatic terminal stop consists of a screw threaded extension of the drum shaft outside of the operating sheave and of a frame or yoke connected with the operating sheave which surrounds the same. On this screw are two stationary nuts and one traveling nut, so adjusted that when the car reaches either terminal the nuts will engage, and the operating sheave will be caused to rotate with the drum, when a slight rotation is all that is necessary to open the switch, apply the brake, and bring the apparatus to a stop. The elevators are manufactured by the Elektron Manufacturing Company, of Springfield, Mass., with branch offices at New York City, Boston, and Rochester, N. Y. This company were among the first to adapt electricity to elevators, and they make direct elevators for both freight and passenger service, ranging in speed from 10 feet per minute to 300 feet per minute, and in capacities from ten pounds to ten tons.



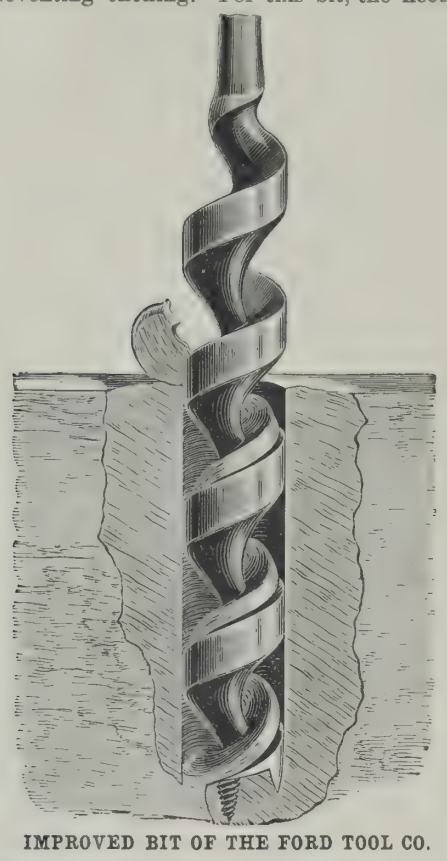
A PRIVATE RESIDENCE ELEVATOR.



THE BRAKE, SWITCH, AND AUTOMATIC STOPS ON THE MACHINE.

STRICTLY FIRST-CLASS BITS AND AUGERS.

Our illustration represents a tool with single concaved twist, giving it a single cutting edge and a single projecting lip, the thread of the screw point being a continuation of the twist of the upper part, so that one merges into the other. The tool is manufactured by the Ford Tool Company, manufacturers of strictly high-grade bits and augers, of Holyoke, Mass. Each bit is forged from bars of best cast-steel, between dies and under the trip-hammer, making a better and stronger tool than can be produced by twisting. The concave shape of the upper surface of the twist has the effect of drawing the borings toward the centre or axis of the bit, thus preventing friction of borings against the sides of the hole, and thereby also preventing choking. For this bit, the necessity of



IMPROVED BIT OF THE FORD TOOL CO.

constantly withdrawing for removing the chips does not exist. The cut shows the self-cleaning action of the tool, and also presents its general shape. The drawing was made from an actual boring with the bit, the hole being made one-half in each of two separate pieces of wood, which were then separated to give the model for the artist and to show its action. The bits were tried in different kinds of wood vertical to the grain, diagonal thereto, and in other ways. The straightness of the hole was also remarked, and the absence of any tendency to split the wood was an evidence of the good clearance. The screw point held its grip very well, no pressure whatever being required for the feed, even in end-grain boring. The action of the edge is a true cutting one, not a scraping one.

WINDOW AND DOOR SCREENS.

The number of cases in which screens at doors and windows fail to be efficient when they are most needed, in warm and sultry summer weather, render it a matter of greater importance than it is usually deemed for the careful housekeeper to insist on having only easy working and well fitting screens, which may be readily put up or taken down as desired, and which will not detract from the appearance of the apartments they are designed to protect. The Willer Manufacturing Company, of Milwaukee, Wis., have for some years made a specialty

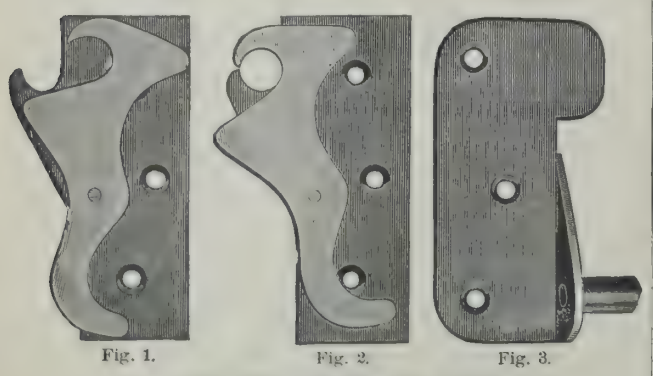


Fig. 1. Fig. 2. Fig. 3.

WILLER HANGER AND HINGE.

of, and obtained a high reputation as manufacturers of first-class door and window screens, and in their catalogues describe many varieties of such screens. The accompanying illustrations represent one of the many styles of their screens, and its hanger and hinge. The Willer hanger for entire screens and storm sash is designed to hang them at the top, so that they may be swung out from the bottom, as shown in the illustration, in the case of screens for washing and cleaning the windows, and with storm sash for the same purpose and for ventilation. The screens and sash can all be easily and quickly fitted and hung in place from the inside, and the device is absolutely self-locking. The screens and sash once in place can never be blown off by the wind, no matter how far open they may be at the bottom, and the device when used on storm sash does not interfere with sliding screens. The supporting brackets are made right and left hand, to be placed at the upper corner of the window on edge of casing—a bracket or hanger being shown in Figure 1—and do not disfigure

THE WILLER HANGING WINDOW SCREEN.

the appearance of the window from the outside. On this bracket is a movable arm, which, when thrown forward at the top, as shown in Figure 2, covers the pin on the hinge plate, and holds it securely in place. The hinge plates are also made right and left, and, as shown in Figure 3, have a lower side projection, which presses against the lower ends of the movable arms on the brackets, forming the lock, which can be opened at any time by a screwdriver, piece of wood, or a nail. Two eight-inch wire hooks and eyes are a part of a set of hangers, their position being in accordance with the distance it is desired to swing out the screen or sash, and a simple handle is also secured to the centre of the bottom rail and a plate on top of the sill.

Bommer Spring Hinges.

Considering the beauty in design and finish of modern hardware, it is surprising to note the clumsy fixtures still in use in many places for closing doors. The most artistic entrances, where lightness, elegance, and beauty should attract the eye, are often marred by their utilitarian hideousness. Utility is good, but utility combined with beauty is better. The Bommer spring hinge, manufactured by Bommer Bros., 351 Jay street, Brooklyn, N. Y., combine utility with beauty in a way so effective as to have attained a wide popularity. The novel manner of forming up the leaves of the Bommer spring hinge from steel, bronze, or brass under enormous pressure, and in such a way that a section in the line of the greatest strain shows a deep, sharp, double corrugation, gives great structural strength, and, as the World's Fair award aptly says, makes them "practically unbreakable," while the inbending of the edges of the side flanges forms a gauge for applying double action hinges, giving absolute certainty of a fair swinging door as a result, and saving time in hanging. By ingenious construction, the disadvantage of the softness of the metal in bronze and brass hinges is entirely overcome, all the wear being thrown upon the interior steel skeleton, making them as durable in every respect as the same goods in steel, while, by using the compound spring in the larger sizes, the power is increased, yet rendered more elastic, giving that easy movement to the door for which the Bommer spring hinge has become famous.

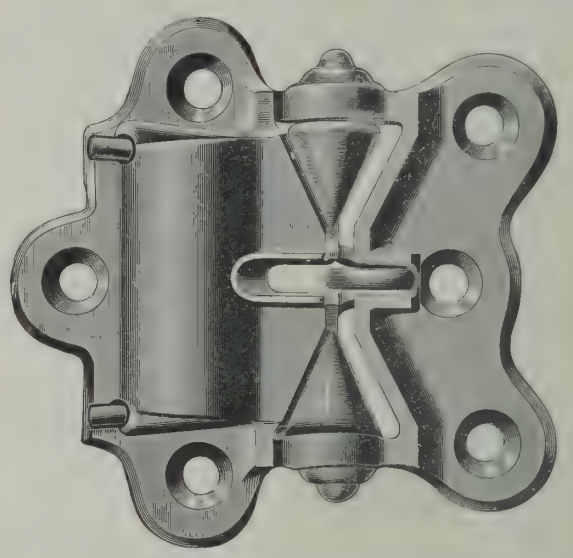
A BEAUTIFUL SHEET COPPER BASE OF SOLDIERS' MONUMENT.

The illustration represents the base of soldiers' monument erected at Wooster, Ohio, 5 ft. high, 2 ft. 10 in. square, with appropriate emblems and inscriptions on each side, the side in illustration showing emblem of Grand Army of the Republic. On this base is placed a Corinthian column with capital at top, and this column is surmounted by a life-size statue of a soldier, all made in sheet copper, oxidized, giving it an antique bronze finish, making a beautiful and artistic monument in every way, and one that will last for ages. The statue on this monument represents a soldier at "Parade Rest," is very striking and lifelike, made in heavy-gauge sheet copper, all joints countersunk and riveted, with frame of bronze tubes and bars, making it exceedingly stiff and rigid, equal in every way to cast work, and at the same time, being much lighter in weight, is very easily and securely fastened in place.

The base and statue are the work of W. H. Mullins, manufacturer of architectural sheet metal work and statuary, Salem, Ohio, who has also recently completed a very artistic and perfect statue of Mercury for the Commerce Building, at the Exposition to be held next summer at Nashville, Tenn. The latter statue is a beautiful piece of work, equal in every respect to cast work, and by improved process of manufacture every line and detail of the model is brought out perfectly in the finished figure. Mr. Mullins submits photographs of model to his customers for approval before completing the work, and from these he can tell exactly how the work will look when completed. He has also furnished bas-relief figures for gable panel of the Commerce Building. In centre is the Coat of Arms of Tennessee, and immediately above this the Caduceus and Winged Wheel of Commerce. On each side of the Coat of Arms are bas-relief statues, cotton bales, barrels, etc., all made in sheet metal, making a very handsome and artistic panel. Another recently completed life-size statue is that of "The Skirmisher," for monument at Elyria, Ohio, a very handsome piece of work, and he is at present making a statue of a soldier for monument at Fayetteville, Ark., together with emblems for base of monument.

A NEW SPRING HINGE FOR SCREEN DOORS.

The illustration represents a new pattern in compact form of the "New Idea" spring hinge, which has, during the many years it has been before the public, attained wide popularity. It is made by the Stover Manufacturing Company, of Freeport, Ill., and in its new dress the design has been improved, while retaining all

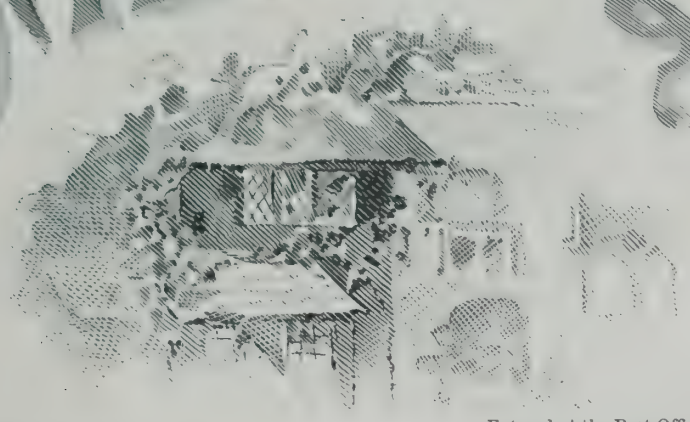


THE "NEW IDEA" '97 SPRING HINGE.

the good qualities found in the old pattern. Its strength, power and lasting qualities have been fully tested, and this change reduces the cost of manufacture, enabling the company to give the trade the benefit of lower prices, while guaranteeing the hinge in every particular.

BASE FOR SOLDIERS' MONUMENT.

SCIENTIFIC AMERICAN.



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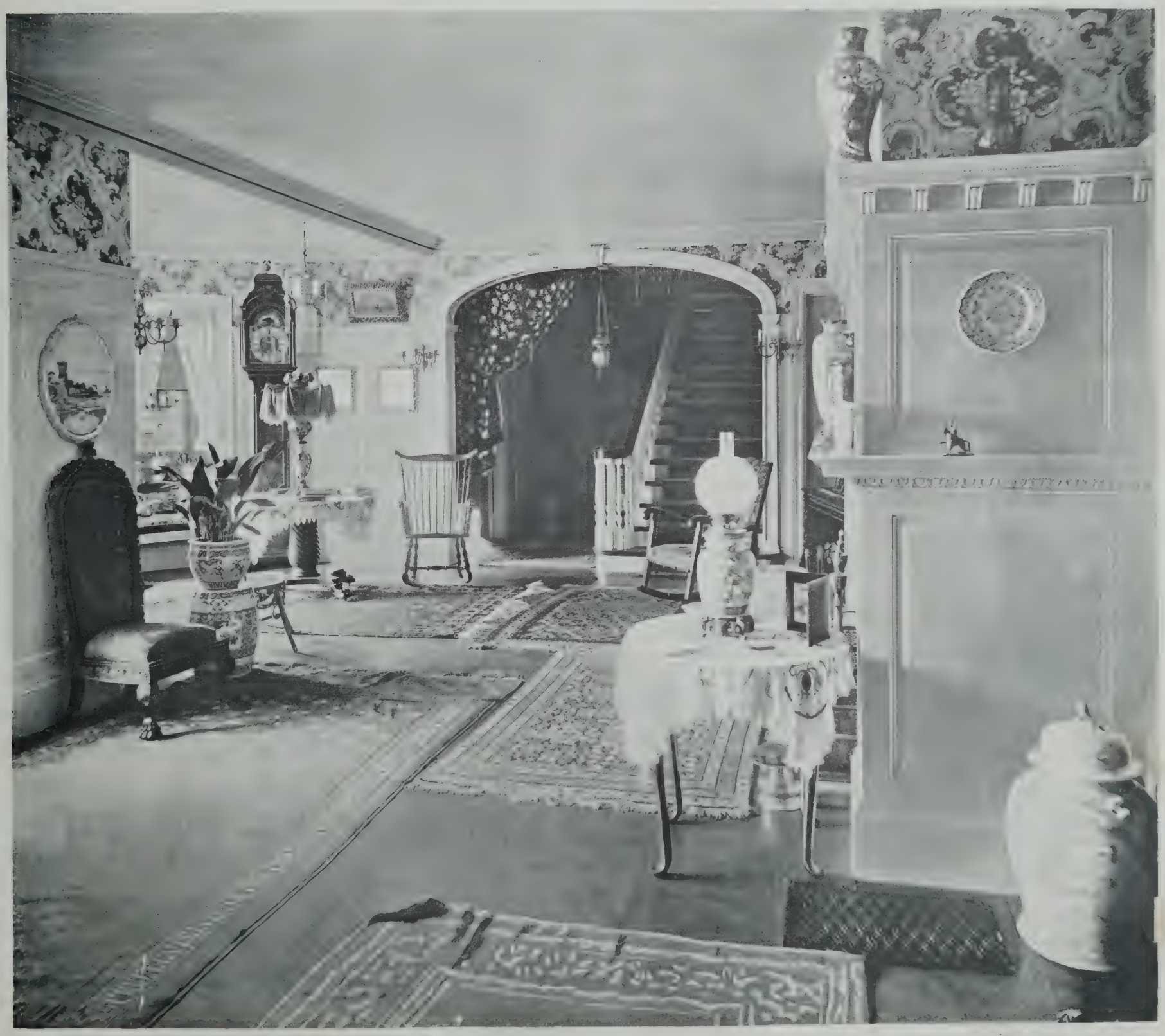

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THE

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THE WINDMILL AND THE WATER SUPPLY OF SUBURBAN AND COUNTRY HOMES.

It is likely that few people, as they look at a modern American windmill, with its skillfully designed and carefully constructed mechanism, ever realize how ancient a device the windmill is, and for how many long centuries it has been, in common with the watermill, the only mechanical power that was largely used by man. There is good reason to believe that, in a crude form, the windmill was used as early as the eleventh century, and it is certain that it began to grow quite common in the twelfth century. For six centuries it continued to be, next to water, the great prime mover of the industrial world, and in the Lowlands of Europe, where the general level of the country prevented the use of watermills, it seems to have been (if we except the use of animal power) the only source of power for driving machinery.

Then came the advent of Watt and the steam engine. The new prime mover was, of course, more costly; but its great power in proportion to its bulk, its reliability and continuous operation as compared with the uncertainty and intermittent service of the windmill, and, perhaps, above all, its mobility, led to the discarding of the ancient source of power except for special classes of work. It held its own, however, especially in the Lowlands, for milling and pumping purposes, and to this day the clumsy but picturesque old structures are a striking feature of the landscape.

The revival of the windmill has been due to the remarkable change which it has undergone in American hands. The huge four-bladed mill of Europe has been replaced by the neat, compact circular wheel, with numerous blades or slats, with which we are familiar in this country. The same sail or blade area is obtained in a much smaller, lighter and more compact and easily managed machine. By disposing the material to the best mechanical advantage, the weight has been greatly reduced, so that a child can start or stop an American wheel with ease; moreover, the tower that carries it may be made of a light and pleasing design. The American windmill has established itself not only in the United States, but in every part of Europe, and has shown that in its perfected form the windmill has a sphere of work in which for economy and convenience it has no competitor. It has been estimated that in this country alone there are over half a million windmills now at work, and reliable authority has estimated the annual increase in sales at fully fifty thousand.

Of course, the chief drawback to this source of power is its uncertainty, a limitation which restricts its use to certain classes of work, chief of which is that of raising water and storing it for domestic use. There is no doubt that in America, at any rate, nearly the whole of the windmills are doing this kind of work, and indeed in many of the Western States a farm is regarded as incomplete unless it is furnished with a windmill pump for the supply of the domestic wants and for watering the stock.

Of late years there has been a great and rapidly growing demand for small mills for the domestic water supply of suburban and country homes—a work for which they are admirably adapted. It frequently happens that detached villas are built in suburban locations where the city water mains have not been put in, and are not likely to be for a lengthy period. In such cases an excellent substitute may be found in digging a well and erecting a windmill and tank. If care is taken in designing and painting the tower and tank-housing, the structure may be made to harmonize with the dwelling and outhouses, and in many cases it will form an attractive feature in the group of buildings. The whole plant can be built for a few hundred dollars, the interest on which will usually be less than the average city water rates; moreover, the first outlay will be practically the only expense entailed, the wear and tear of a well-made mill being remarkably small. If the city water should be subsequently laid on, the mill can still be utilized for lawn sprinkling and general garden purposes.

In this connection one is tempted to speak of the suggestion, originally made, we believe, by Sir William Thomson, to use the windmill for the storage of electricity for domestic lighting. The idea is certainly a captivating one; there is a charm about the notion of supplying one's own light and water by means of a separate plant located on the home lot, and driven by a power which costs nothing to the user. In the present state of the arts, however, it would be impossible to build and operate such a plant successfully. Of the various means of storing the energy of the wind, water is excluded because of the great size and awkwardness of the necessary tanks, and compressed air would require costly tanks of special construction. It would, of course, be possible to store up electrical energy in secondary batteries, using the windmill to run a generator, and a plant of this kind has been successfully operated at the home of one of our leading electricians. The same difficulty of bulk and cost of plant, however, stands in the way of the application of such a system to suburban or country homes, and until the secondary battery has undergone considerable development these objections will be quite prohibitory.

A RESIDENCE AT LARCHMONT, N. Y.

We present on page 61, in this issue, a residence recently completed for Martin Cassidy, Esq., at Larchmont, N. Y. The building is treated in the colonial style throughout, and it has many good features, including a spacious and well-shaded piazza. The underpinning is built of local bluestone laid up at random. The superstructure above is of wood, and the exterior framework is sheathed and covered with cypress shingles, and finished natural with cream-white trimmings. The roof is shingled and finished natural. Dimensions: Front, 50 ft.; side, 40 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 9 ft.; second, 9 ft.; third, 8 ft. The hall is treated in old ivory white, which is quite in harmony with the deep rich red burlap with which the walls are covered above the paneled wainscoting. The ceiling is beamed. This hall has a pleasant bay window thrown out with paneled seat and separated by columns forming an arcaded effect, and also a staircase separated in a similar manner, with seats and newels and balusters treated in old ivory white with mahogany rail. This staircase is lighted by stained-glass windows in an effective manner. The fireplace has facings and hearth of tiles and a mantel of excellent design. The parlor is treated in old ivory white, and it has a unique little bay thrown out with seat, and a fireplace trimmed with cream tiles and mantel. Dining-room is trimmed with oak. It has a paneled wainscoting, above which the walls are covered with green burlap. The bay window at one side contains a paneled seat, while opposite is the open fireplace and tiled work, and at end a buffet built in of excellent design. Kitchen and pantries are wainscoted and are fitted up with the best modern fixtures complete. The second floor contains four bedrooms, two dressing-rooms, closets, bathroom and two servant bedrooms, with private staircase to kitchen. This floor is treated in white. The bathroom is wainscoted and furnished with porcelain fixtures and exposed plumbing. Third floor contains four bedrooms and trunk room. The floors throughout are laid with cone-grained yellow pine. Cemented cellar contains laundry, furnace and other necessary apartments. Cost $10,000, complete. Mr. Frank A. Moore, architect, 123 East Twenty-third street, New York.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT CLINTON TOWNSHIP, N. J.

We present herewith in this issue, on page 60, a modern cottage erected for William Zimmerman, Esq., at Clinton Township, N. J. The design presents a good example for a modern cottage, and it combines both pleasing elevations and a well arranged plan, and is erected at a low cost. The underpinning is built of brick laid up in red mortar. The building above of wood is covered with clapboards and painted pearl gray. The roof is shingled. Dimensions: Front, 27 ft. 6 in.; side, 35 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft.; third, 7 ft. 6 in. Cemented cellar under whole of house contains furnace, laundry, and other necessary apartments. The interior throughout is trimmed with cypress and finished natural. The reception hall contains an ornamental staircase with columns rising to ceiling and forming an arcaded effect with paneled back at stairs. The parlor is treated in china white and it has an open fireplace furnished with tiled facings and hearth and mantel. Dining-room has a bay window thrown out with flower shelf and a large china closet. Kitchen is wainscoted and fitted up with the best modern fixtures complete. Second floor contains three bedrooms, bathroom and large closets. Bathroom is wainscoted and furnished with the usual exposed fixtures and nickelplated trimmings. Third story contains ample space for storage and two bedrooms. Cost $2,500 complete. Mr. Charles P. Baldwin, architect, Prudential Building, Newark, N. J.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

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THE PEQUOT LIBRARY BUILDING AT SOUTHPORT, CONN.

We present in this issue, on page 58 and below, the Pequot Library Building, at Southport, Conn., which was a gift from Mr. and Mrs. E. B. Monroe to the village of Southport. It is situated upon the site where the famous Pequot war was fought and ended in 1637, and from which it gets its name. The portal at front entrance consists of three arches, supported on round, polished columns, the centre one of which bears the title "Pequot Library," while the other two bear the dates "1637" and "1887," respectively. The building is treated in the Norman style of architecture. It is constructed of granite, of a pinkish gray color, warm in tone, while the roof is covered with red tiles, harmonizing most excellently with its spacious lawns and its general surroundings. The vestibules are trimmed with oak, with glass partitions and tiled floors, while the wall next to the exterior is of stone. The librarian's room is used as a coat room, and an office for the sale of tickets is located and connected with vestibule. The lecture room, 50 x 50, is one of the principal apartments, and is finished in cherry, with trimmings and furniture in harmony with each other, while the roof is trussed in a heavy manner, and provided with panels ceiled up with similar wood. The trustees' room, 15 x 17, is trimmed with cherry, and it has a beaded wainscoting, and an open fireplace, with tiled hearth and facings, brass trimmings, and mantel of excellent design. The next room of importance is the reading-room, 25 x 25, which is trimmed with oak, and finished with sea-green effect. It has a wainscoting, and a massive wood cornice, from which rises a ribbed ceiling. The fireplace is fitted up with tiled facings and hearth, wrought-iron trimmings, and a massive mantel extending to ceiling, with paneled overmantel. The sewing-room and desk is conveniently located, and off from this room, and connecting with same, is a fireproof library vault having a capacity for 16,000 volumes. The reference and ladies' writing-room are finished similar to reading-room, with the exception that the latter is furnished with cherry furniture, which is quite in harmony with the color scheme of that particular room. The cellar contains the heating and ventilating plant. Mr. R. H. Robertson architect, 160 Fifth Avenue, New York.

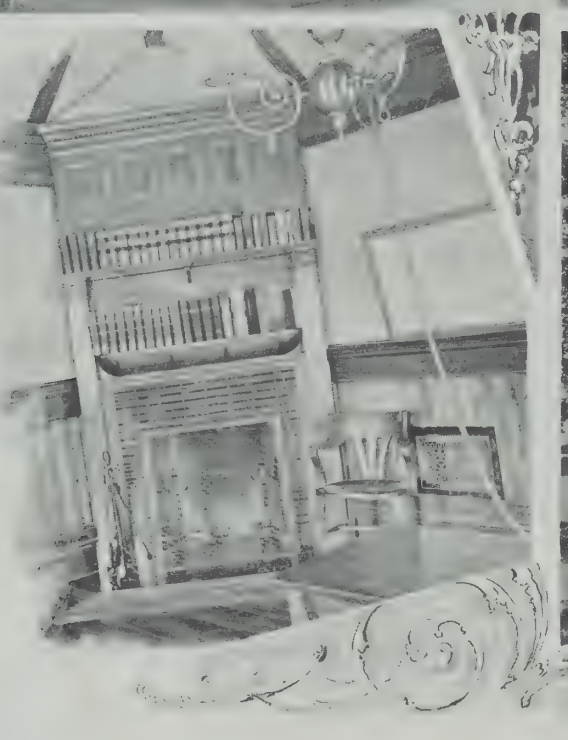
Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

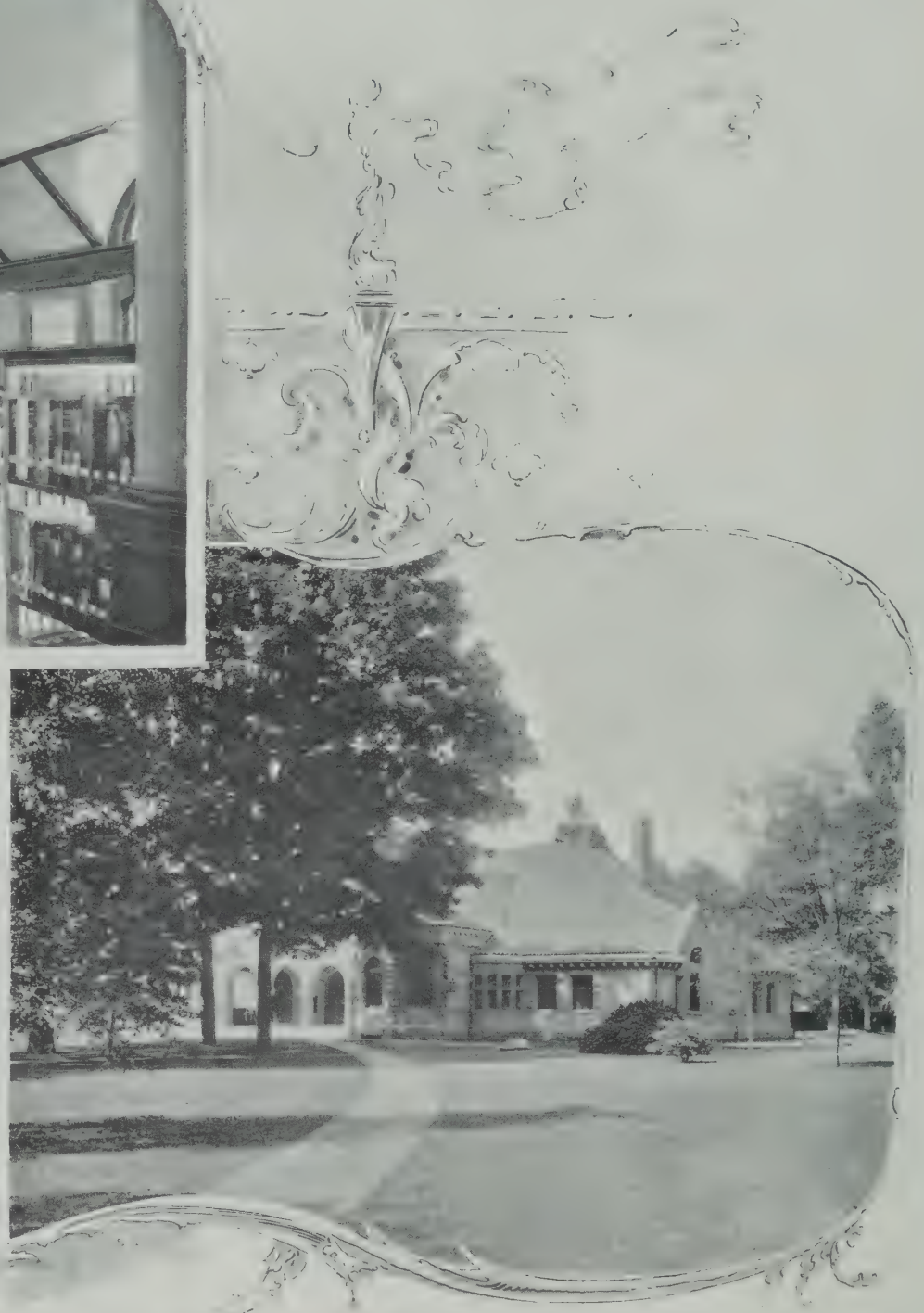
A RESIDENCE AT CHESTNUT HILL, MASS.

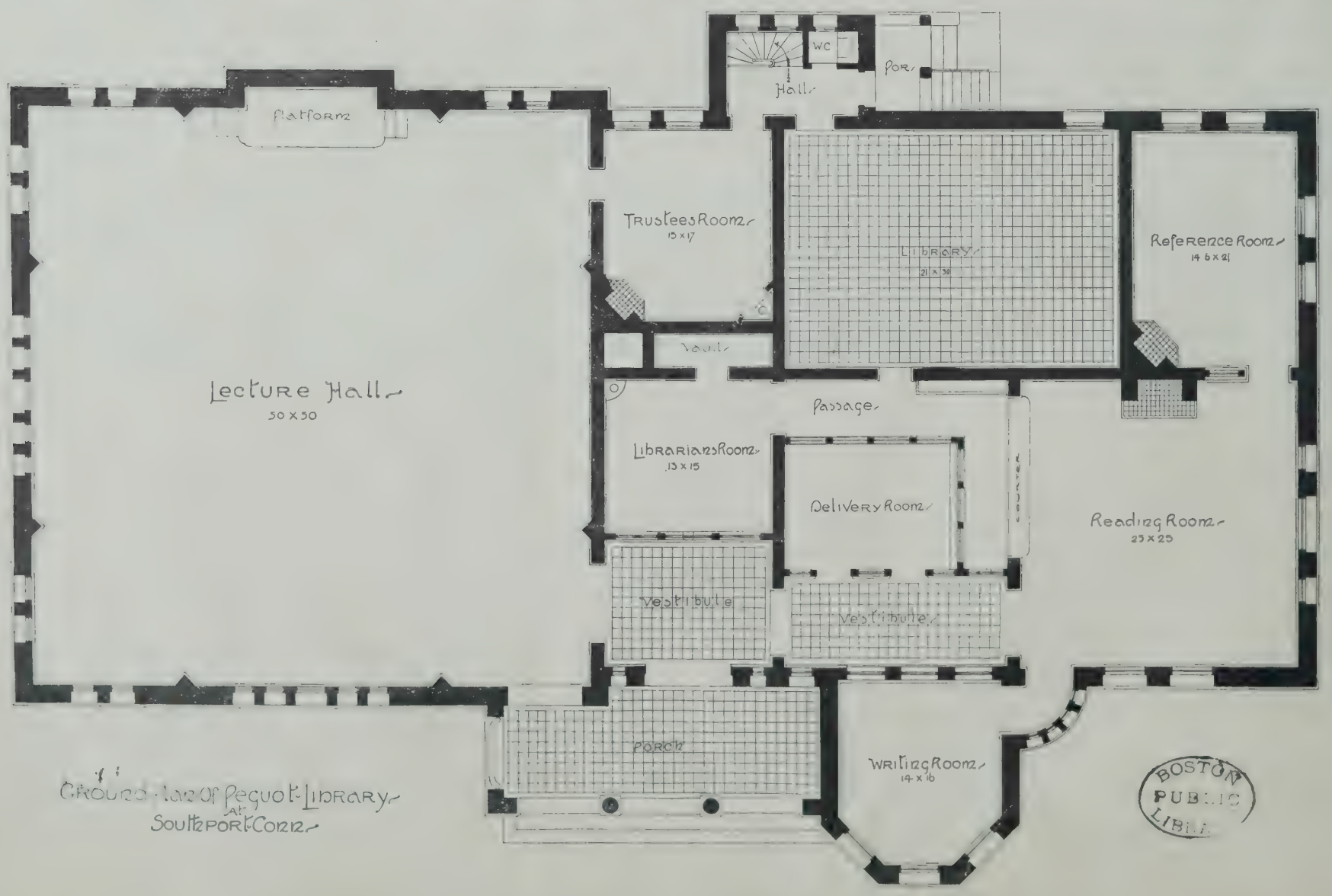
We present herewith in this issue as our subject for colors, and on pages 55 and 59, a residence recently erected for Frederick William Payne, M.D., at Chestnut Hill, Mass. The engravings illustrate one of the most picturesque and attractive residences of its class in the vicinity of Boston. The design is in keeping with its site, which is a pleasing one, with its low, rambling roof sloping down and gracefully covering the piazza, the rough fieldstone laid up at random in part of first story, the latticed bay window effects, all of which are pleasing features. The underpinning, balustrade to front piazza, and part of first story are built of rockfaced fieldstone laid up at random. The remaining part of house is of wood, and is covered with shingles on the exterior and stained, The roof lines are well broken by dormer windows, and the whole is shingled. Dimensions: Front, 60 ft.; side, 55 ft.; not including piazza. Height of ceilings; Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The hall is a very handsome apartment, spacious and inviting, and its walls are paneled to the height of seven feet; the space above is papered in an artistic manner, and the whole is finished with a moulding as cornice. The staircase hall is separated by an elliptical arch, and it contains stairs with spindle balusters, a newel post composed of a cluster of columns, and a mahogany rail. The reception case and both halls are treated with china [illegible] fireplace is built of Perth Amboy brick, with hearth and facings of same, and a mantel of unique design. The reception-room is treated in white and yellow, and it has a fireplace of handsome design, with facings and hearth of tiles and mantel. The den, or green room, is trimmed with whitewood and finished natural. It contains an open fireplace built of brick, with hearth and facings of same, and mantel. The library, an attractive apartment, is trimmed with cherry, and it has a paneled wainscoting and ceiling beams. It also contains bookcases built in, a paneled divan, and an alcove, separated by a colonnaded archway, and with a rise of one step. This alcove is also provided with bookcases, paneled seat, and an open fireplace built of brick, with hearth and facings of same. The dining-room, pleasing in its appointments, is trimmed with oak. It has a paneled wainscoting, a wood cornice, and a brick fireplace, with hearth and facings of same. On either side of fireplace there are china cabinets built in, with leaded glass doors. The small bay window with seat is a good feature. The china closet, forming access to kitchen, is furnished with dressers, drawers, and cupboards. Kitchen is wainscoted and trimmed with whitewood, and it contains dresser, large pantry with icebox with outside entrance thereto, sink and closet. The second floor is trimmed with white pine, and is treated in white. It contains four bedrooms, dressing-room, linen closet, twelve closets, and bathroom. The bathroom is paved and wainscoted with tiles, and is fitted up with porcelain fixtures and exposed nickelplated plumbing. The fireplaces on this floor are furnished in a neat manner. The third floor contains a billiard room and several other apartments, including servants' quarters, with stairway. The cellar contains furnace, laundry, and all the necessary apartments. Mr. Horace Frazer, of the firm of Chapman & Frazer, 89 State Street, Boston, Mass., was the architect.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

THE PEQUOT LIBRARY BUILDING, AT SOUTHPORT, CONN.





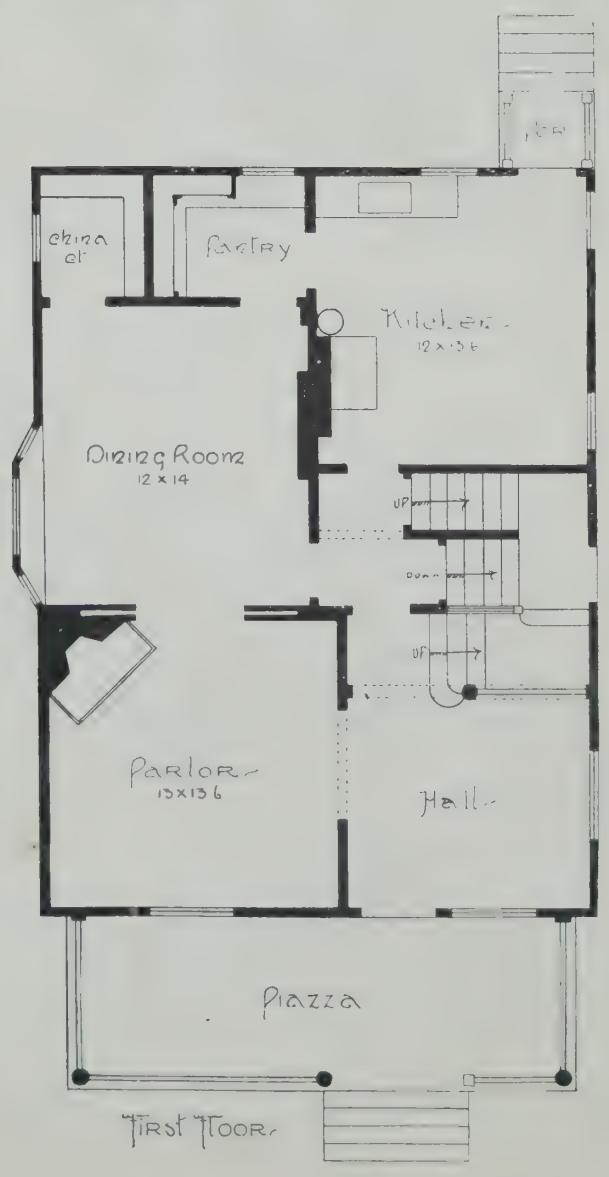


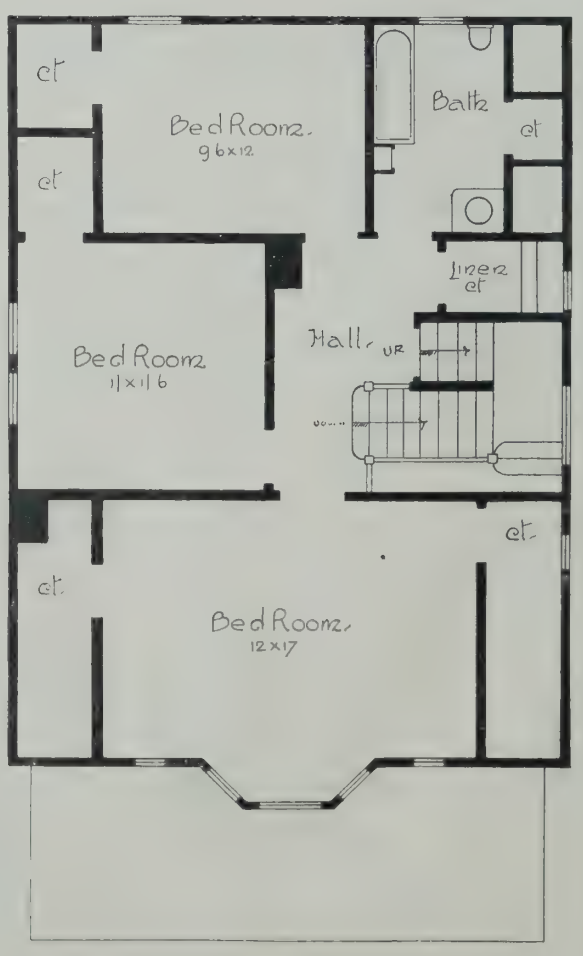
Ground Plan of Pequot Library at Southport Conn.

BOSTON PUBLIC LIBRARY

THE PEQUOT LIBRARY BUILDING AT SOUTHPORT, CONN.—See page 57.

A RESIDENCE AT CHESTNUT HILL, MASS.—See page 57.





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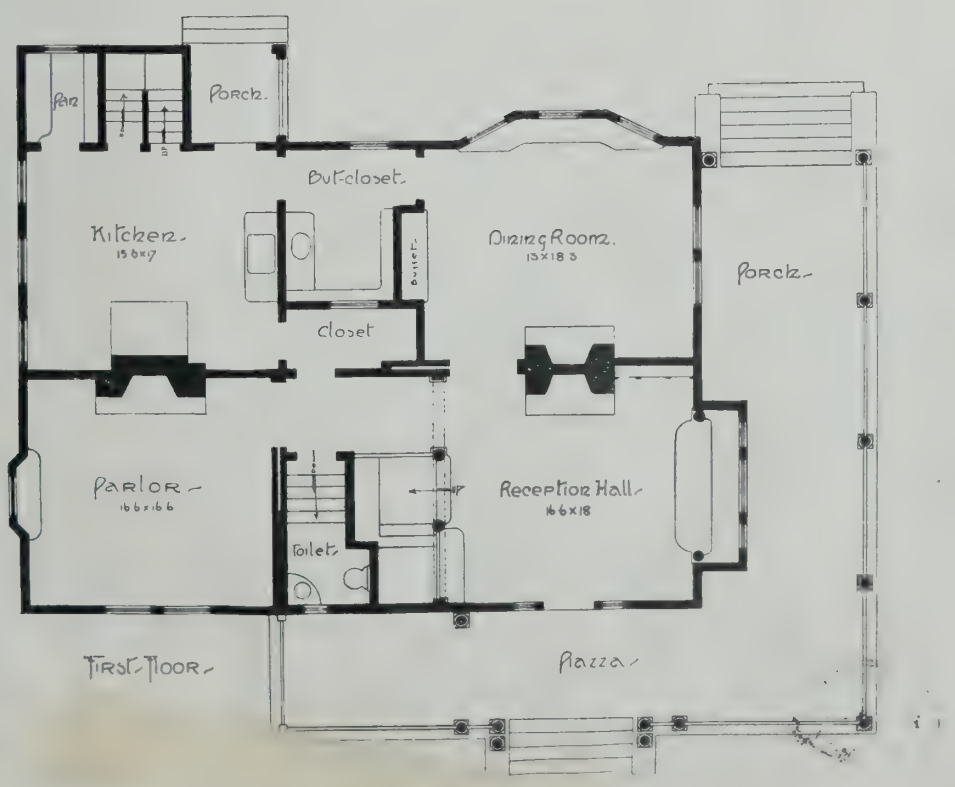
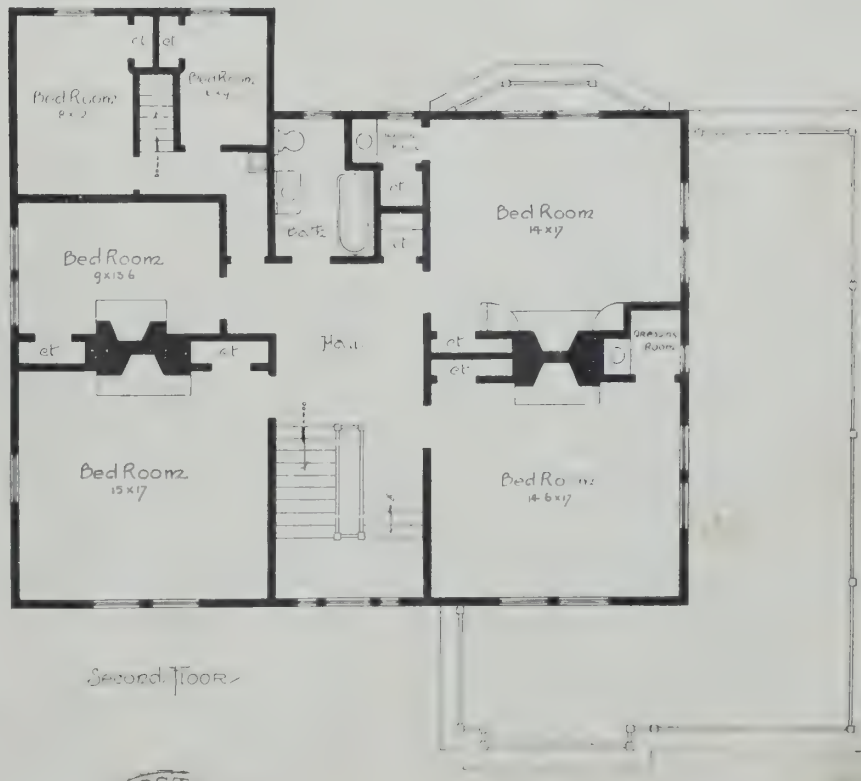
A COTTAGE AT CLINTON TOWNSHIP, N. J.—See page 56.





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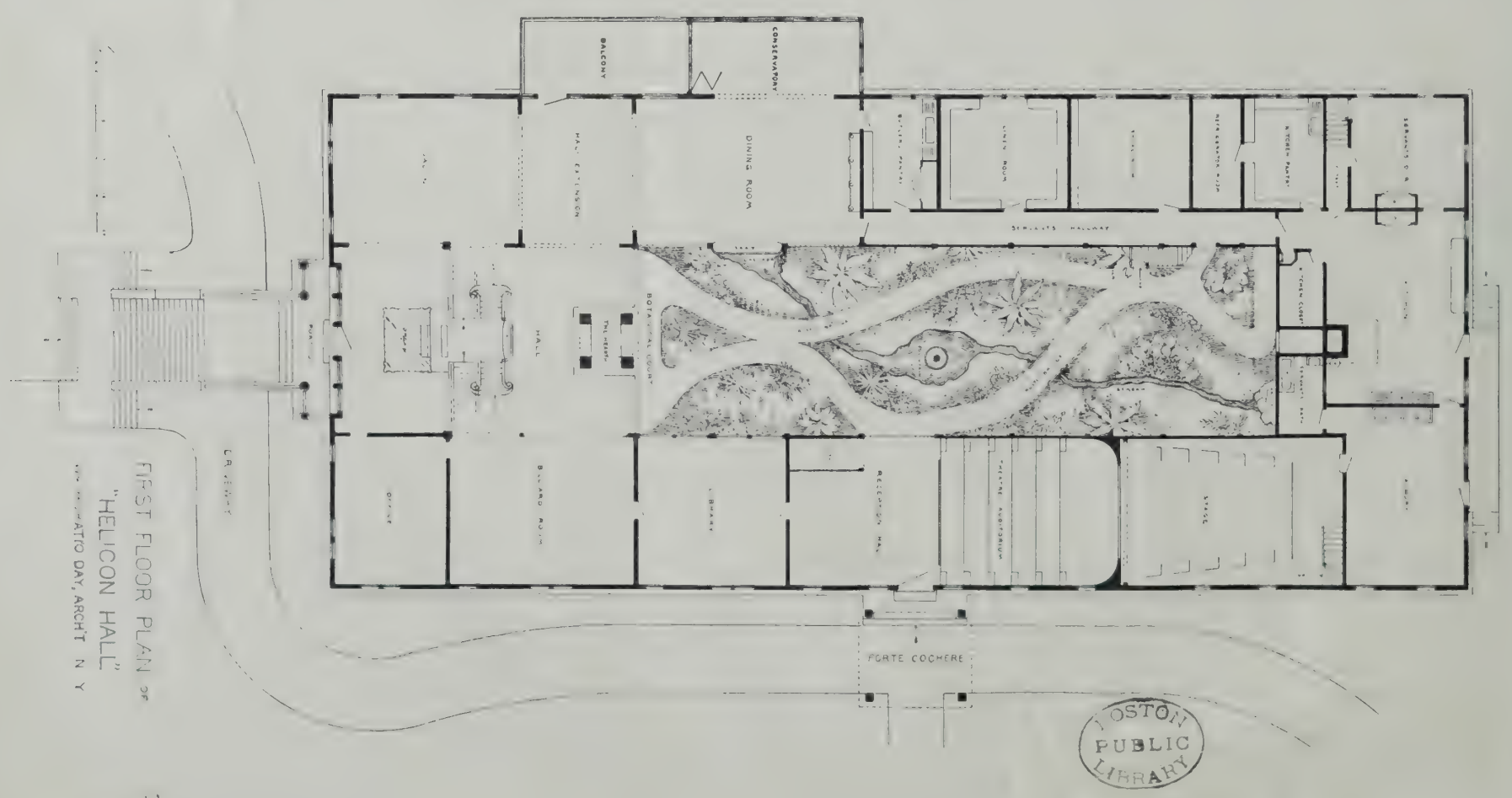
ESIDENCE AT LARCHMONT, N. Y.—See page 56.



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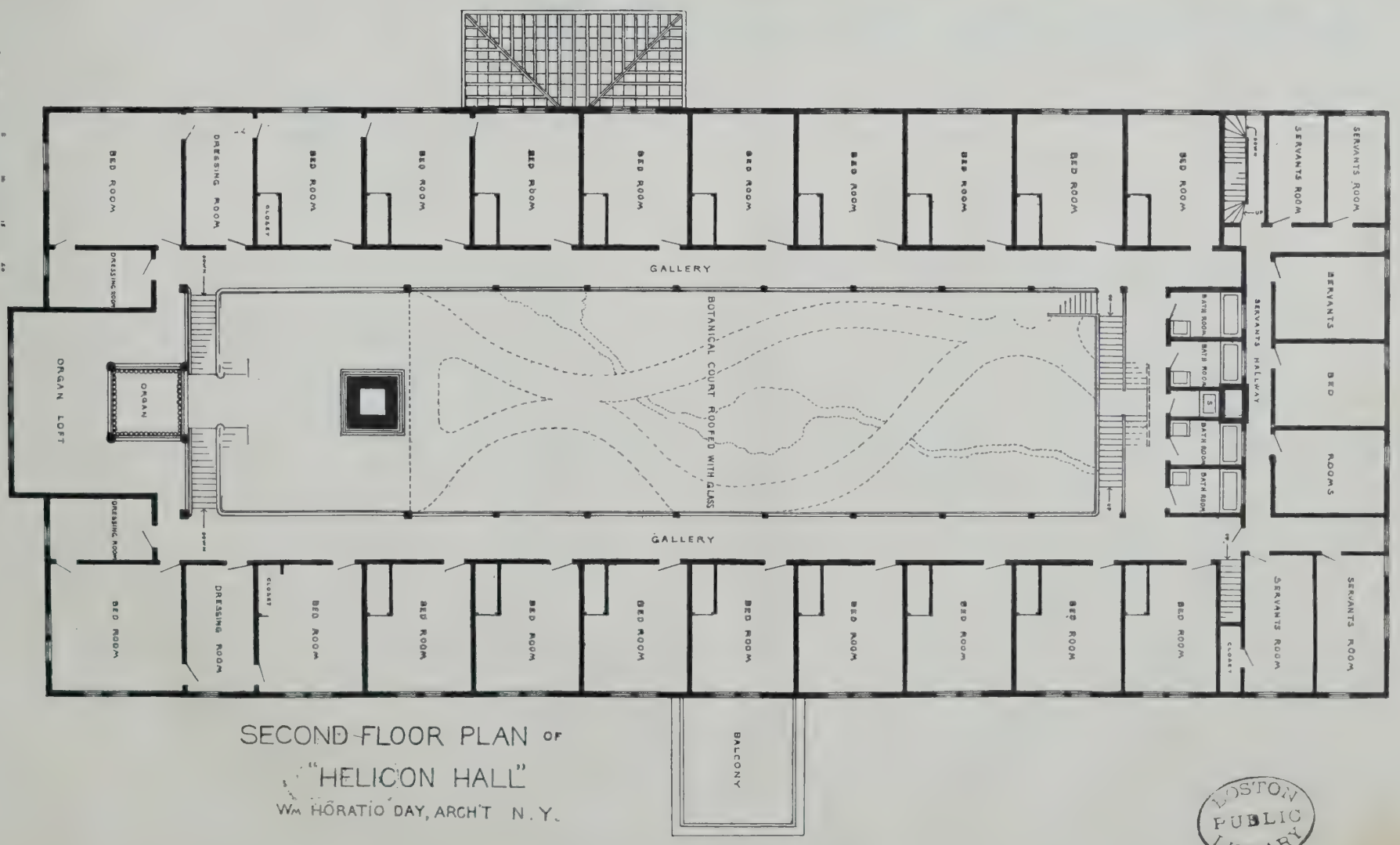
"HELICON HALL," ENGLEWOOD, N. J.—See page 70.



SECOND FLOOR PLAN OF "HELICON HALL" WM HORATIO DAY, ARCH'T N.Y.

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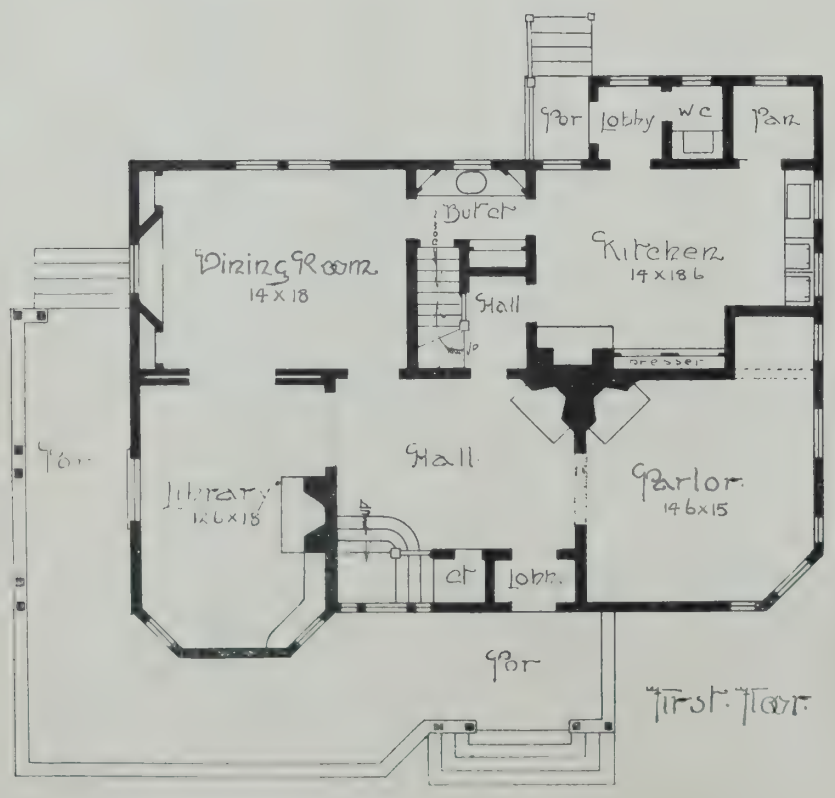
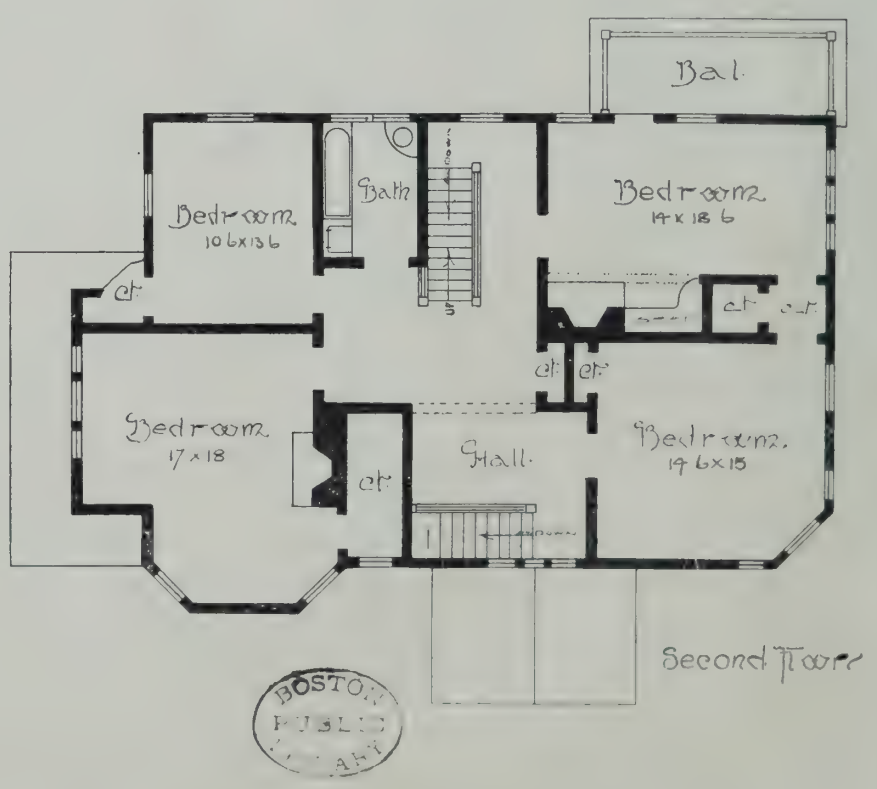
"HELICON HALL," ENGLEWOOD, N. J.—See page 70.





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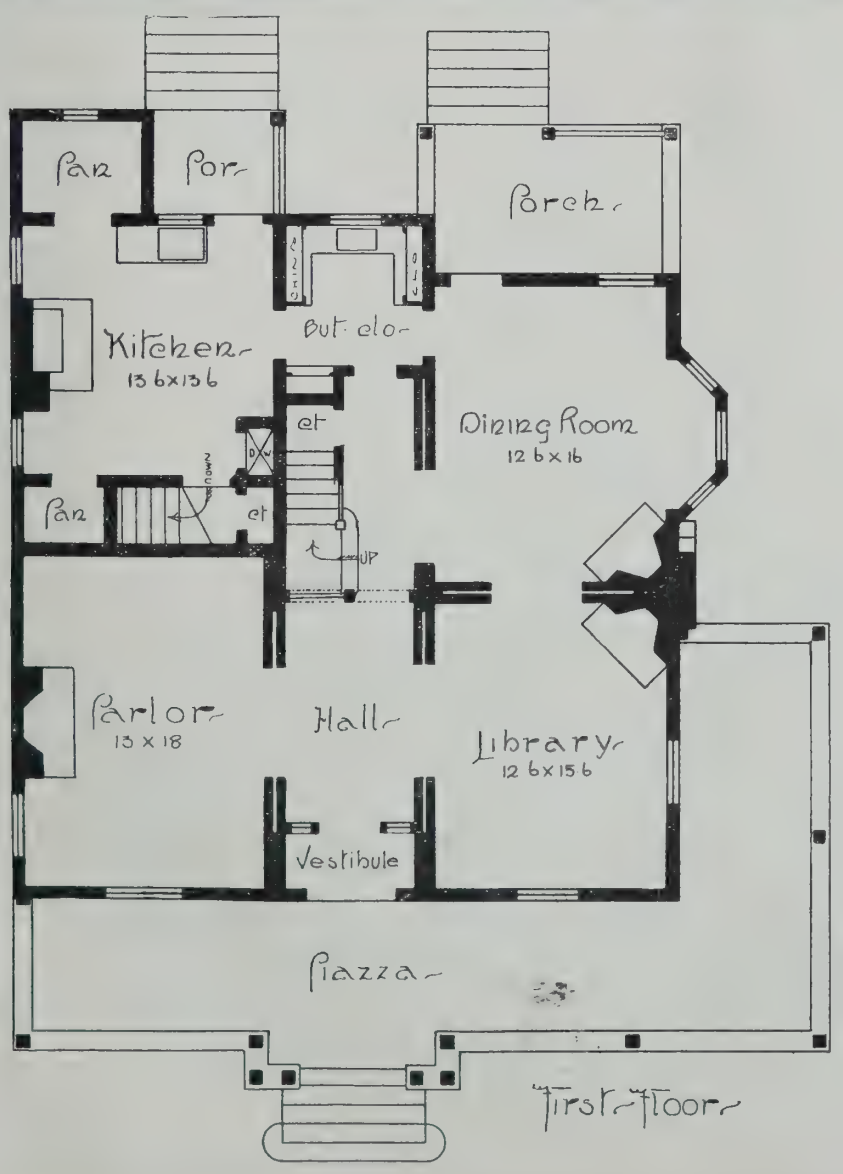
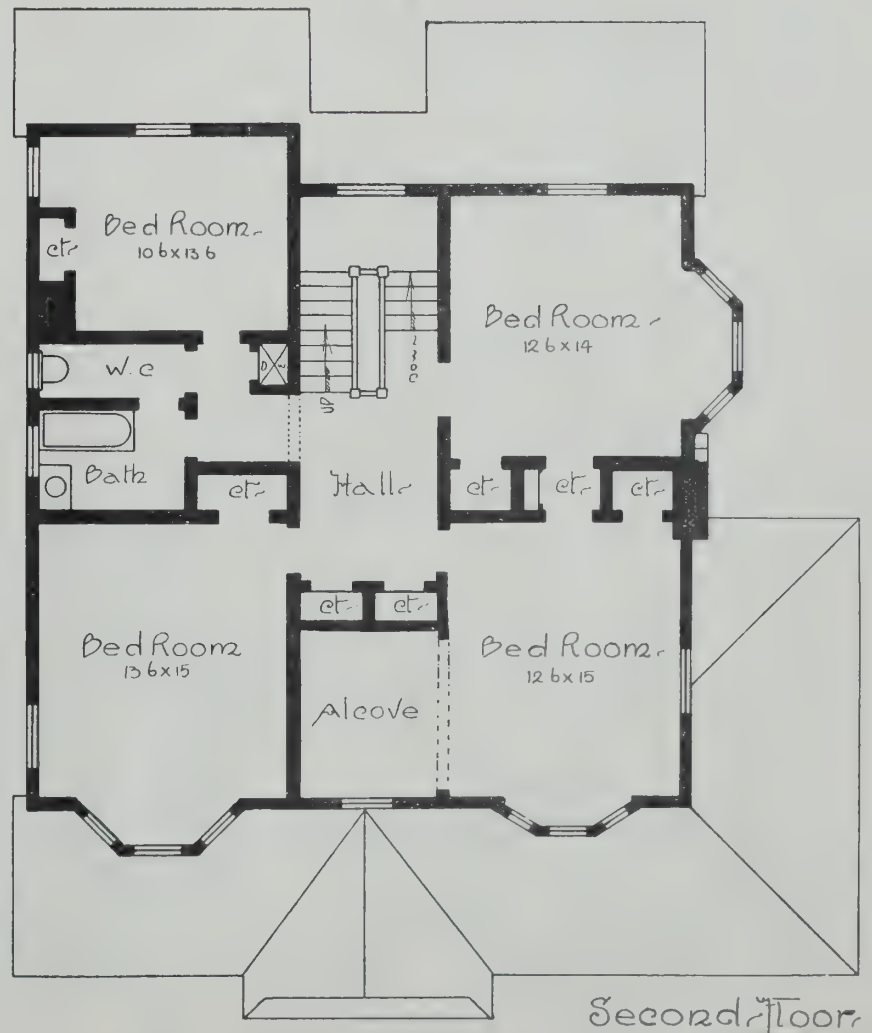
A DWELLING AT ORANGE, N. J.—See page 71.





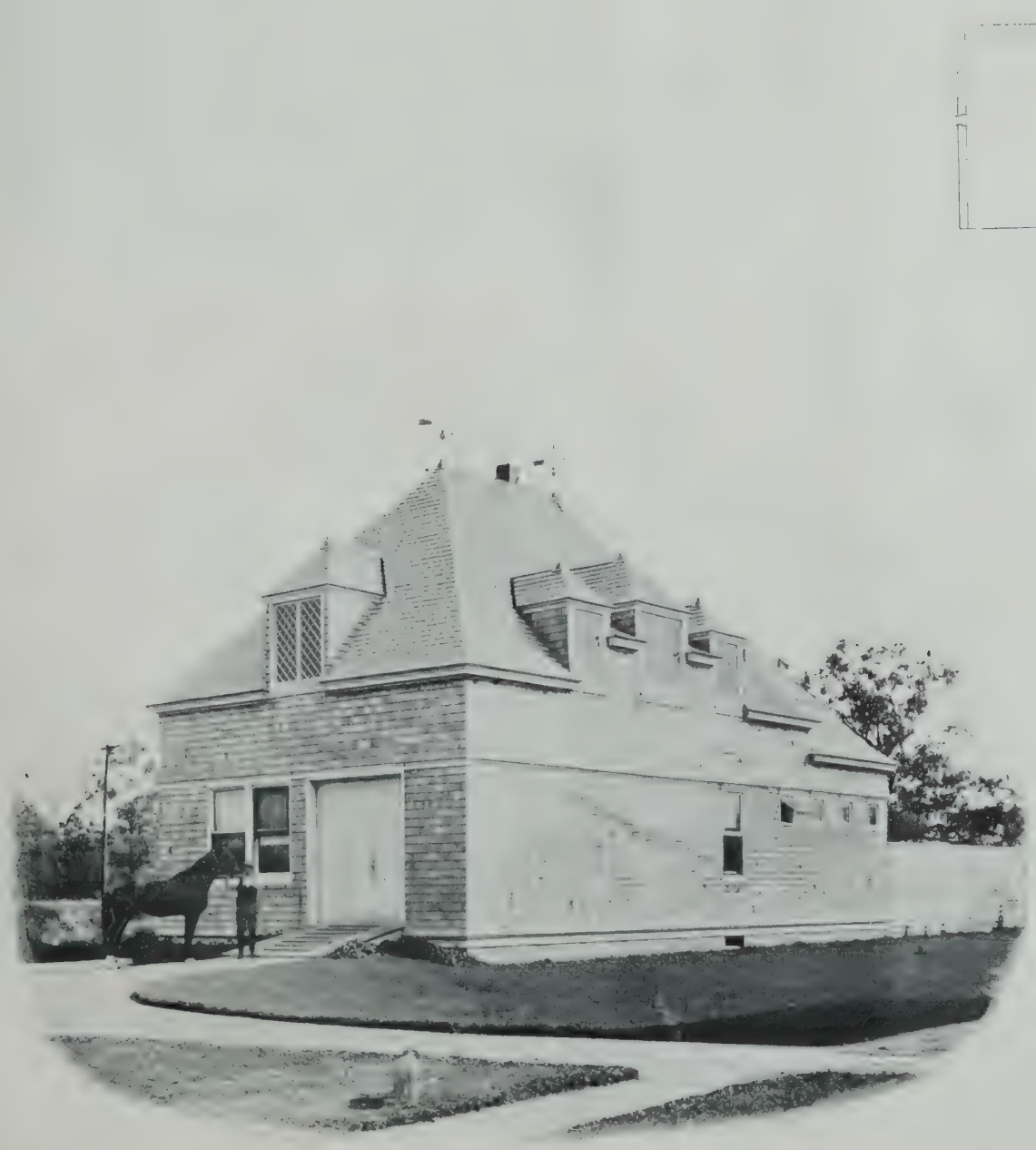
A MODERN DWELLING AT FOREST HILL, NEWARK, N. J.—See page 71.

BOSTON PUBLIC LIBRARY

A RESIDENCE AT LARCHMONT, N. Y.—See page 70.

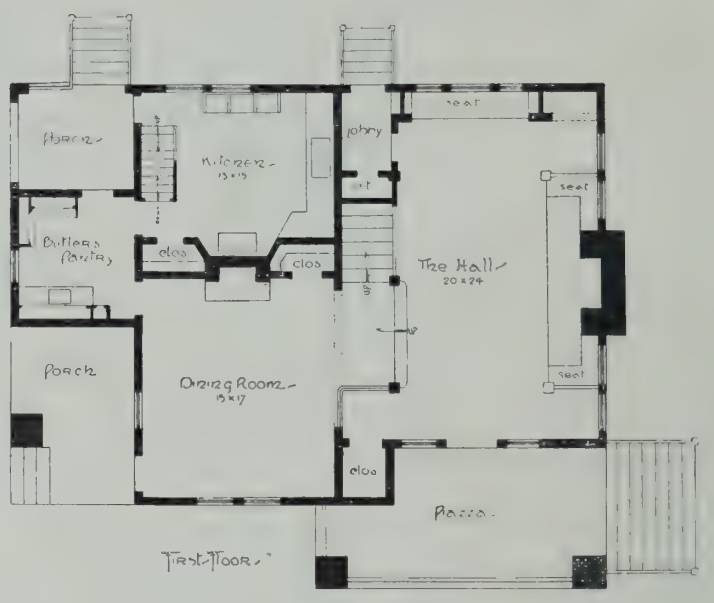
BOSTON PUBLIC LIBRARY

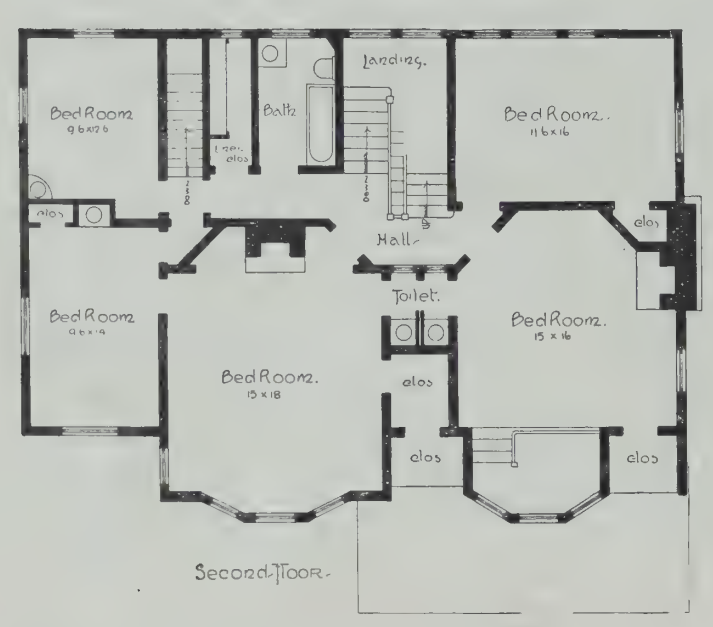
INTERIOR OF A RESIDENCE AT LARCHMONT, N. Y.—See page 70.

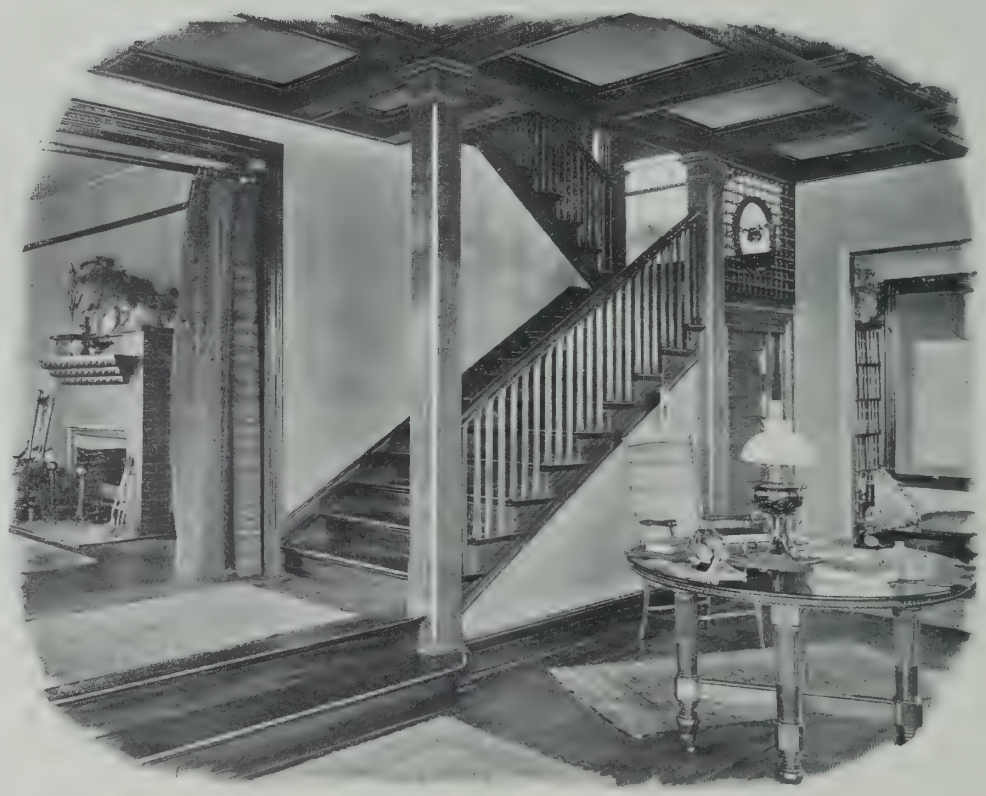


A STABLE AT LARCHMONT, N. Y.—See page 70.

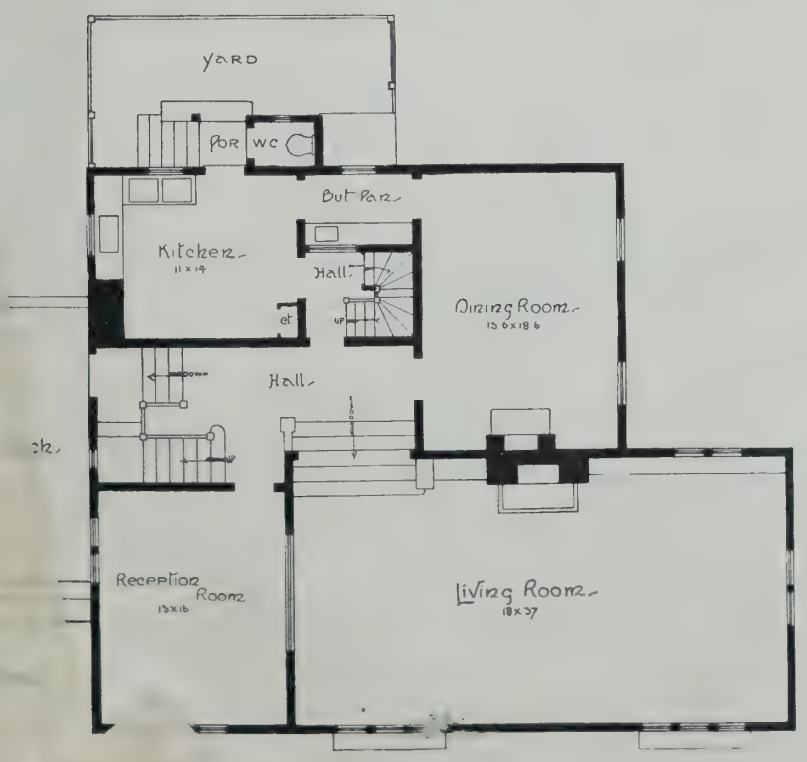
BOSTON PUBLIC ART

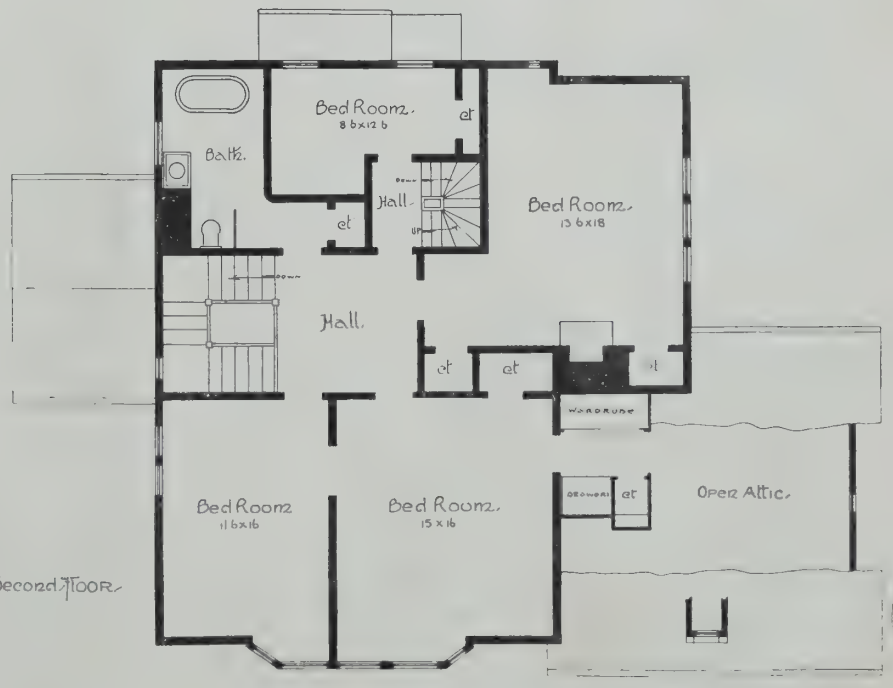






A COTTAGE AT THOUSAND ISLANDS.—See page 70.





A MODERN RESIDENCE AT SOUTH ORANGE, N. J.—See page 70.

"HELICON HALL."

We present herewith in this issue, on pages 62 and 63, a most novel and unique example for a modern educational school, which has been recently completed for the Rev. John W. Craig, at Englewood, New Jersey. This hall has been erected in the midst of a woodland slope of ten acres, upon a level with the Palisades, and while much of the natural woodland still remains, a sufficient portion of it has been cut away toward the west, giving broad vistas over the valley below to the Ramapo Mountains, nearly thirty miles distant. The situation is healthful and picturesque beyond description. The principal feature predominating in this school is the progress of educational science, from the methods of the past ages to that of the free principles of modern times. This point has been very strongly brought out in the advancement along educational lines, and the attention of those who have given the matter much thought has drawn out the fact that schools should differ, even as various classes of pupils differ, and that the widely diverse circumstances into which children are born and amid which they pass their entire time during youth, outside of school, should be duly considered, and that the sooner a pupil can be regarded as an individual and the less as a mere member of a class, the better will be the result. It is a recognized fact, that boys who inherit great responsibilities should be especially fitted for the obligations they have thrust upon them, and that they should be taught to exercise their duties with the wisest precaution. In as much as the family is the ideal centre of education, so should the school be in its surroundings and methods. In providing refined surroundings of this character, it also teaches boys how to appreciate and treat these beautiful things with delicacy and consideration, and a well-educated youth ought to be taught not only the strong exercises for developing his bodily frame, but also practices that will increase sensibility and refinement, and when once he consciously grows to feel more capable of certain efforts of the mind amidst these surroundings rather than among ugly ones, much is accomplished toward the purpose of making him a valuable factor in life. The Rev. Mr. Craig, a Harvard graduate, served the cause of education on customary lines for twelve years or more as headmaster in Bishop Coxe's diocesan school, De Veaux College, at Suspension Bridge, New York, and in Bishop Huntington's St. John's School, Manlius, N. Y., and then he took a needed rest and spent three years in extensive travel abroad. In 1892 he returned to America with his system of education mentally developed, the designs sketched for its unique home, and he went immediately to work to accomplish the aims and nature of his system and its method, and with his own designs he sought the skill of Mr. William Horatio Day, whose artistic genius has never been better manifested than in the building and decorating of "Helicon Hall." A regular curriculum of studies and daily routine of work will be carried out within limits. The rational system which recognizes the mental differences in persons must admit many modifications and variations. In this respect Mr. Craig claims superiority for this school over his past experiences in education. The actual methods of instruction will be upon the lines of the more approved natural methods.

The exterior of the hall is designed in a simple manner, and while it is really of no particular style of architecture, it is classic in feeling and presents a bright, stately and dignified appearance. The entrance way arch over porte-cochère and underpinning are built of local blue rubble stone, laid up at random, with rock-faces. The superstructure is sheathed with plaster board plates, and then covered with a cement plaster floated on smoothly and left in its natural silver gray color, while the trimmings are painted white. The main entrance is at the south end of the building, and upon passing into the reception hall a vista is obtained of an unusual feature, the inner court containing the tropical garden, of which we present an illustration. This garden is 85 ft. long, 25 ft. wide, with a glass roof rising 35 ft. above, in which are ventilators. The treatment is of the Indian style, and in order to carry out this effect it has been necessary to use rough surface timber, and to stain same a soft brown color, which is quite in harmony with the surroundings. By the glass roof, above mentioned, the court is thus sheltered even from winter weather, admits all possible sunshine, and nurtures the beauty of vines, flowering plants, ferns, palms, and other trees, and also the tropical lilies that float blossoming on the little stream which winds through the court, crossed by rustic bridges, spreading itself twice into miniature lakes, from one of which springs the silvery spray of a fountain. The whole court is a perpetual feast to the eyes, and it presents during the winter a choice bit of living nature in the lap of home. At the south end is the main hall, with its massive chimney rising from four fireplaces, which, it is safe to say, is the only one of its kind. It is open on all four sides, in the centre of which hangs a huge iron basket, where coal or logs burn equally well. It has been thoroughly tested, and has dispelled scientific doubt as to its practicability. This fireplace is built of buff brick, with hearth, facings, and mantel shelf of same. The next important feature is the grand staircase, with its oak steps, china-white balusters, and mahogany rail, which rises to second floor. On the first landing of this great staircase is the seat of the organist, above which rise the pipes of the organ, an instrument of excellent tone. Around the hall on the one side is Mr. Craig's study and billiard room, while on the other is the salon and the hall extension, opening out upon the western porch. On the eastern side of court is the library and museum, the reception hall and entrance, and the theatre auditorium and stage for talks with illustrating views, for training in vocal culture and eloquence, and for many other uses. On opposite side of court is the dining-room, with conservatory extension, and the butler's closet, linen-room and pantries, all separated by servants' hallway. At the north end is the kitchen, laundry, and servants' dining hall, all of which are furnished in a complete manner with the usual fixtures. The second story is reached by two stairways, and it consists of a corridor running around the entire court and hall. The bedrooms open off from the sides; they are large, airy and convenient, and are provided with double windows. There are twenty bedrooms provided with large closets, four bathrooms, besides seven servant bedrooms, with private hall and stairs to kitchen. At the rear of the court another flight of stairs leads to third floor. On this floor another corridor lines the court, and it consists of rooms for laboratory work, darkroom, a large studio lighted on four sides, a room for instruction and practice in graphic and plastic arts. Half way along the corridor, on the west side, is the entrance to the tower, built for astronomical purposes. The upper room is for the observatory and telescope. The basement contains a bowling alley, fencing-room, swimming pool 20x40 ft., in which a slanting bottom gives a depth of water from 4 to 9 feet. Jets of live steam warm it in winter. The capacity of this pool is 35,000 gallons. There are also shower baths. The heating system is under the culinary departments, and the method is an indirect one with fan—that is, a large iron fan which can be made, when necessary, to turn several hundred revolutions a minute, drawing the air directly from out of doors through a stack of three thousand feet of steam coil, then driving the heated fresh air into every room, even warming the court to an equal temperature. We have introduced briefly some of the views and matter pertaining to this hall, which have been carried out according to the ideas of Mr. Craig, which he created to conform with his methods of natural education. Mr. William Horatio Day, architect, 41 Union Square, New York.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A RESIDENCE AT LARCHMONT, N. Y.

We present on pages 66 and 67, in this issue, a residence and stable recently erected for Frank Hardy, Esq., at Larchmont, N. Y. The building is placed upon a site with a slight incline, giving it a commanding and prominent situation. The design has many unusual attractive features, including a spacious and well-shaded piazza, a porte-cochère with a peaked roof, tower at corner, and the whole crowned with a graceful lined roof, which is well broken by numerous dormer windows and gables. The foundation is constructed of local building stone, while the underpinning and first story is built of hydraulic pressed brick, with rock faces, and of a yellowish brown color. The effect of this brickwork in contrast with the silver gray of the natural shingle finish of the superstructure is quite novel and pleasing. The chimneys are built of similar brick. The roof is covered with shingles, and left in their natural state. Dimensions: Front, 55 ft.; side, 51 ft., not including piazza. Height of ceiling: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft. 6 in.; third, 9 ft. The vestibule is trimmed and paneled with oak, and it has an oak floor. The entrance doors have windows of stained glass on either side. The main hall, which is placed in the centre of the plan, is spacious in dimensions, and is trimmed with antique oak. It has a paneled wainscoting eight feet in height, and a ceiling beamed in a massive manner. The staircase is of an ornamental character, with newel post formed of a cluster of columns, and is lighted very effectively with stained glass windows. The reception room, at the left of entrance, is trimmed with bird's-eye maple, and it contains an open fireplace fitted up with tiles, brass trimmings, and a mantel of excellent design. The parlor is treated with white enamel, and the fireplace has white enamel tiles with brass trimmings and a mantel with columns. At the rear of this apartment is the library, which is trimmed with oak and provided with book-cases built in, paneled seat, and fireplace with old brown tiling and brass trimmings. Dining-room is trimmed with oak. It has a paneled wainscoting rising to ceiling. The fireplace on one side of room is built of brick, with green and black (mottled effect) tiling and wrought-iron trimmings; the mantel has columns rising to ceiling, and handsomely carved. A buffet is built in on the opposite side of room, and is carved in keeping with fireplace and the other trim. The gas fixtures are of wrought-iron of unique design. The bay-window contains a paneled seat. Kitchen and pantries are trimmed and wainscoted with yellow pine, and are furnished with the best modern fixtures. The second and third floors are trimmed with whitewood, and finished natural. The former contains four bedrooms, dressing-room, two bathrooms, besides two servants' bedrooms, with private hall and stairway to kitchen. The bathrooms are paved and wainscoted with Italian marble, and they are fitted up with the best modern fixtures and exposed nickel-plated plumbing. The private bath contains a shower-bath, which is fitted up with all the improved apparatus. The fireplaces on this floor are fitted up with mantels and tile trimmings. The third floor contains billiard-room, three guest chambers, and trunk-room. The cemented cellar under whole of house contains servants' bath, laundry, furnace, and other necessary apartments.

We also present an engraving and floor plan of the stable, which is designed in keeping with the residence and its surroundings. It has a foundation of stone, an underpinning of brick, and an exterior framework covered with shingles and left to weather finish. The roof is also shingled and ornamented with several dormer windows. The interior is ceiled up with narrow-beaded yellow pine, and finished natural with hard oil. The carriage-room contains ample room for carriages, and it has a carriage wash with cement floor and drain, and harness closet, fitted up with glass cases, etc. The stable contains four stalls and two box stalls, separated and trimmed with the usual ornamental iron trimmings. A novel feature of this stable is that it is lighted and ventilated by a skylight in roof, and is provided with a balcony running around stable, which is reached from second floor. The second floor contains three rooms and bath, all finished off and plastered in a neat manner, for the coachman's use, besides ample storage. Mr. H. C. Stone, architect, Seventy-ninth Street and West End Avenue, New York.

Our engravings were made direct from photographs of the buildings, taken specially for the Scientific American.

A COTTAGE AT THOUSAND ISLANDS.

Our engravings, on page 68, illustrate a picturesque and unique cottage, which was erected on Wellesley Island, St. Lawrence River, near Alexandria Bay, during the summer of 1894. It is in the most thickly populated part of the Thousand Islands. This cottage is situated upon one of the many natural sites for which this beautiful river is noted, and with its rugged stone foundation, piazza piers and chimney, changing to light shingle work above, has the effect of a natural and logical growth from its rocky bed. The stonework is of rough boulder work with deep joints and moss-covered in places. The first story is covered with novelty siding, and the rest of the house with cedar shingles. Dimensions: Front, 46 ft.; side, 31 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft. 6 in. in hall, the rest 9 ft.; second, 8 ft. 6 in.; third, 8 ft. There was very little excavating done, as the ground falls away sufficiently in the rear to give room for a good cellar. It is evident from the first-floor plan that the cottage is designed for summer uses. The principal room, shown on the plan, is the hall, a spacious room, 20 x 24 ft., entered from the piazza through a large Dutch door. This room is abundantly lighted on three sides by nine windows, giving ample light and ventilation. During the many cool evenings the large open fireplace proves a great success; added to the other cozy nooks with paneled seats makes the hall exceedingly attractive. The fireplace is built of brick, with hearth and facings of same. Next to the hall, and upon a rise of two steps, is the dining-room, lighted on two sides and with a porch opening from it. This room has a similar fireplace to the one already described. The butler's pantry, of large dimensions, is fitted up with sink, dressers, cupboards and drawers complete. The kitchen is also furnished with the best modern fixtures. The second floor contains four good bedrooms, a bathroom, den and linen closets. Each bedroom is provided with stationary wash-bowl. One of the rooms has a short run of steps leading up to a pleasant nook in dormer window, while another room is provided with an open fireplace. The bathroom is wainscoted and fitted up with porcelain fixtures and exposed plumbing. The third floor contains two bedrooms and an open balcony. Cost $5,000, complete. Mr. Hobart A. Walker, architect, 71 Broadway, New York.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODERN RESIDENCE AT SOUTH ORANGE, N. J.

We present in this issue, on page 69, a modern residence which has been recently completed for Henry P. Kirby, Esq., at Grove Road, South Orange, N. J. The elevations are unusually attractive, and they present a chaste style of domestic architecture, with sufficient breaking of its outlines to give it a pleasing and effective appearance. The underpinning is built of brick laid up in red mortar. The superstructure above is constructed of wood, and the exterior framework is sheathed, papered, and then covered with white cedar shingles throughout and left to finish in their natural silver gray color. The roof is shingled also and finished similar. Dimensions: Front, 48 ft. 6 in.; side, 38 ft., exclusive of piazza. Height of ceilings: Cellar, 7 ft. 6 in; first story, 9 ft.; living room, 13 ft.; second, 9 ft.; third, 8 ft. The vestibule has a paneled wainscot and seat, and a short run of steps

that lead up to hall proper. The trim in this hall, and all woodwork throughout, are of white pine. The hall is treated with old ivory white. It contains a staircase, ornamental, treated in a similar manner for newels and balusters, while the rail is turned out of mahogany. The reception room is treated in a similar manner, while the walls are finished in old gold. It opens into living room, with opening provided with an ornamental balustrade. The living room, which is reached by a descent of six steps, is of unusual dimensions. It is very handsomely treated in old ivory yellow, and it has bookcases built in, and an open fireplace of brick, with facings and hearth of Sienna marble, and mantel of excellent and special design. The dining-room is treated in white and old green. It has an open fireplace trimmed with tiles and mantel. The kitchen, pantries, and rear hall are trimmed and wainscoted with yellow pine, and are furnished with the best modern fixtures. The floors are laid of cone grain yellow pine. The second floor contains four bedrooms, attic and bathroom; the latter fitted up with porcelain fixtures and exposed plumbing. Third floor is not finished off, but rooms could be provided if desired. Cemented cellar contains furnace and other necessary apartments. Cost $7,500, including furnace, decorations, and everything complete. Mr. Henry P. Kirby, architect, 33 East Seventeenth Street, New York.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODERN DWELLING.

We publish, on page 65, floor plans, together with an engraving, showing a perspective view of a modern dwelling, recently erected for S. Frederick Bailey, Esq., at Forest Hill, Newark, N. J. The design is executed in the American style of suburban architecture, and its lines are well broken by a spacious piazza, numerous bay windows, and chimney. The underpinning and stonework, where shown, are built of field stone laid up at random. The chimney is built of red brick laid up in red mortar. The exterior framework is clapboarded, and painted pearl gray with white trimmings. The gables are shingled and stained a mahogany color. The roof is shingled also, and finished natural. Dimensions: Front, 38 ft.; side, 42 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The first story is trimmed with oak. The hall contains an ornamental staircase with columns extending to ceiling, and furnished with cap and spindle transom. The vestibule has a tiled floor, and it is provided with stained glass windows on either side of entrance door. The parlor is a spacious apartment, and it has a false fireplace with tiled hearth and facings, iron fire-back, and an ornamental hardwood mantel. Library and dining-room have hardwood floors and open fireplaces, built of brick, and trimmed with tiled hearths, facings, and mantels. The butler's closet is fitted up with drawers, shelves, and cupboards, the latter inclosed with glass doors The kitchen is trimmed and wainscoted with yellow pine, and is fitted up with large pantries, sink, and dumb-waiter, running from cellar to third floor. Second floor is trimmed with cypress. It contains four bedrooms, large closets, and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed plumbing. Third floor is trimmed with whitewood, and it contains two bedrooms and ample storage. Cemented cellar contains furnace, laundry, and other necessary fixtures and apartments. Mr. Frank Ward, architect, 245 Broadway, New York.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A DWELLING AT ORANGE, N. J.

We present herewith, on page 64, a dwelling recently erected for Daniel A. Kennedy, Esq., at Orange, N. J. The design is treated in the Queen Anne style, with colonial detail. The elevations are very attractive and the plans show a most convenient interior arrangement. The underpinning is built of rockfaced red sandstone, laid up at random. The exterior framework is sheathed, covered with shingles and stained a mahogany color. The trimmings are painted white. The roof is shingled and left to finish natural. Dimensions: Front, 46 ft. 6 in.; side, 36 ft., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. The entrance hall vestibule has a tiled floor and is paneled and trimmed with oak. Hall is trimmed with similar wood and it contains an ornamental staircase with spindle balusters and carved newel posts. It is lighted by a cluster of leaded glass windows glazed with delicate tinted glass. The fireplace is built of Tiffany brick, with facings and hearth of same, and mantel of oak. The parlor is trimmed with whitewood, and treated with china white and gold. It is provided with a pretty nook, and an open fireplace with cream-white tiled hearth and facings, and a most exquisite mantel made from a special design. Library is trimmed with whitewood and is darkened an antique oak color. It contains an open fireplace built of brick and a paneled divan. Dining-room is trimmed with white pine and is finished natural. The window seat has a china cabinet on either side with leaded glass doors. Kitchen and pantries are wainscoted with narrow beaded stuff and are provided with all the best modern fixtures. The second floor is trimmed with whitewood and treated in delicate colors. This floor is furnished with four bedrooms, large closets and bathroom; the latter wainscoted and fitted up complete. There are two bedrooms and trunk room on third floor. Cemented cellar contains furnace and other necessary apartments. Cost $6,500 complete. Mr. Edward Hapgood, architect, Hartford, Conn.

Our engraving was made direct from photographs of the building, taken specially for the Scientific American.

Fireproof Structures.

In the December issue of *Stone*, under the heading of "The Fire-trap Modern Sky-scraper," William Sooy Smith, the Chicago engineer, whose remarks we have referred to in several late issues, reviews at some length the fires that have occurred of late in this class of buildings, and makes the following observations as to the action of iron and steel when subjected to heat, and suggests later the use of stone, protected by more obdurate materials, in these buildings. He says:

The rate of expansion or contraction of iron and steel, which are practically the same, is one one-hundredth of an inch per foot for a change of temperature of 100°. If a vertical post or column of iron or steel is 150 feet in height, the total expansion for a change of 100° in temperature will be one and one-half inches; and for a change of 1,000° (to red heat), fifteen inches; and this change frequently occurs during a fire.

While a column changes its length fifteen inches, the integument of stone, brick or tile expands or contracts much less, and so a 'war to the death" takes place between the component parts of what we call "steel buildings."

There may be steel buildings in which the fireproofing has been so well done that they will pass through an ordinary fire without such failure. But if the steel becomes even moderately heated, its stiffness will be measurably diminished, and the strength of the upright members so reduced as to cause them to bend and yield. This is more likely to occur, as the horizontal beams and girders will at the same time expand (unequally from the different degrees of temperature), and throw the posts out of vertical and into buckling positions. This is the third difficulty.

It is as if a man were required to stand upright and take upon his shoulders all he could stand under, then take a strong dose of physic and have his knees pushed from under him.

Under these circumstances, if floors were built of perfectly rigid materials, the unequal settlement would crack them into pieces and ruin them. The elasticity of the steel beams now used in the floor systems partially obviates this difficulty, but not wholly, as many floors in which they are employed, notably those of our post office and custom house building, are badly demoralized and broken up by unequal settlements. Here is the fourth difficulty, and our present system does not provide for it satisfactorily.

Now, supposing that we have succeeded in overcoming the great difficulties already pointed out—if steel and iron are used as principal parts of our buildings, and these parts are not perfectly protected from corrosion, the building will be comparatively short-lived.

There are many imperfections in minor details, such as weakness of brackets and their fastenings, want of proper provision for resistance to strains resulting from wind pressure, etc, which we need not here describe or discuss. They are only alluded to because they are liable to occur in the class of building we have under consideration, unless they are guarded against by the architect who designs, and the superintendent or contractor who builds the structure. There is little danger of such defects in the buildings planned by many of our excellent Chicago architects, and erected by first-class Chicago builders. The well do not need prescriptions; they are only for the sick.

Having thus considered the difficulties of our problem, let us endeavor to discover proper remedies for them, for we perform the most valuable service when we do not merely discover a difficulty, but when we point out the best way to overcome it.

The third difficulty, resulting from the expansion and contraction of the metals employed in the construction of tall buildings, may be obviated by protecting these metals absolutely from any considerable change in temperature, if this be possible, or by throwing out the metals altogether and substituting tile, brick and stone, as far as may be practicable. As the weights to be borne by the vertical members of buildings, such as we have described, are very great, it becomes necessary to use materials and models of construction which will make these vertical members as small as may be in cross section, consistently with the loads they have to carry and the strains they have to resist, in order to economize floor space, which is the revenue-producing part of the building.

Now, first-class cut stone masonry laid in hydraulic cement mortar has about one-fourth the compressive resistance of the stone of which it is composed. If, therefore, the stones themselves can be placed in absolute contact, without the interposition of mortar, it is fair to presume that much greater compressive resistance of the material would be obtained. To test the truth of this supposition, I had a square pillar of Lemont limestone made by the Western Stone Company, one square foot in cross-section and about nine feet high. It was composed of seven stones, taken from their thickest stratum, and so cut as to lie on the natural bed in the pillar when this was set up. The bearing surfaces of the blocks were planed perfectly true. I sent this pillar to the Government testing machine, at Watertown, Mass., and asked that it be set up by simply washing the beds with a very thin grout of the very best English Portland cement. This pillar was subjected to the entire crushing power of the machine, 800,000 pounds, and it was only when the full strength of the machine was employed that the pillar showed the slightest symptom of yielding. Then small flakes were chipped off the outside surfaces of two of the blocks, which is proof that the pillar was on the point of yielding. If pillars or columns having a cross-section of four square feet instead of one were used, the total resistance of such pillar to crushing would be far more than four times 800,000 pounds, for it is a well-known fact that the crushing resistance of any substance increases in greater ratio than the area of cross-section of such substance.

If, however, we assume that the strength was increased in that simple ratio, a pillar two feet square of Lemont limestone, made as already described, would sustain a weight of 3,200,000 pounds. One-third of that load, or say 1,000,000 pounds, would be a safe load for such pillar. If we add a covering two inches thick on all sides of a pillar, which is sufficient to afford it all necessary protection from fire, if a method is used which will shortly be described, the whole size of the pillar so protected would be but two feet four inches each way, which is but little larger than many of the steel columns now used with their fireproofing. These pillars would, of course, decrease in size as the loads decrease, story by story, from bottom to top of the building. The blocks of which they are composed may be doweled by a steel rod running down through the centre of the pillar, and connecting cap plates of cast iron that should be put on the pillars at the level of each story.

If limestone or any other kind of stone which does not resist heat well is used, it can be protected by a covering of agolite or any other very refractory, non-conducting and non-expansive material. I have seen a slab of "agolite" only one inch in thickness that was held over a flame at white heat half an hour, and then turned over and carried off on a man's hand, without burning it. With such material properly put on and secured to a non-expansive stone column, there would be little danger of any injury to it by fire.

But to avoid absolutely the injury that might come to it by any cause that might crack or remove the covering, and so cause its destruction (as in the case of the steel column), a strong and very refractory stone should be selected for the columns, such as that used in the lining of blast furnaces, which resists for months the white heat to which it is exposed. Of course, such stone would need no fireproofing.

Plates or cap stones can project sufficiently to furnish a support to arches of tile, or beton coignet, which should be used for the floor systems. In wide buildings the pillars should be set in line at right angles to each other, and at suitable distances to make it practicable to construct the whole floor by a groined arch or dome system supported by these pillars.

This system of floor construction is by no means new, as it has been in use for centuries in Spain and Italy. It has been recently introduced into this country by a Spanish engineer, Mr. Guastavino, and has rapidly come into use in our Eastern cities.

It has been found practicable to make strong floors with a very slight rise of the arch in proportion to its span. Steel rods have recently been built into the material of the floors thus constructed, protected from heat or corrosion, and so placed as to take and resist the horizontal thrust of the arches.

There is a balancing and neutralizing of this thrust throughout the entire system of arches except the exterior ones next the outside walls, and it is only in the case of these exterior arches that special provision must be made to take up this thrust.

This may be done by building in twisted steel or rods as above described, or by horizontal tie-rods thoroughly protected from the effects of fire by a thick covering of agolite or asbestos. And the outside walls should for this purpose, and for better security from fire in an adjacent building, be made heavy and strong.

If the mode of construction here pointed out is adopted, the building would be practically unchangeable in its dimensions, indestructible by fire, abundantly strong and as durable as the materials of which it is composed.

It also seems, from the best estimates I can make, that a building constructed in this way will cost less than one with steel and iron framing.

Tile, brick and stone do not corrode, and, while mistakes may be made, and imperfections in design and workmanship are quite as likely to occur in the use of these materials as in that of iron and steel, these can be obviated in both cases by skill and fidelity, without which no system of building can be made successful.

AN IMPROVED BLIND HINGE.

The accompanying illustrations show the new blind hinge which the Wrightsville Hardware Company, Wrightsville, Pa., are putting on the market. Fig. 1

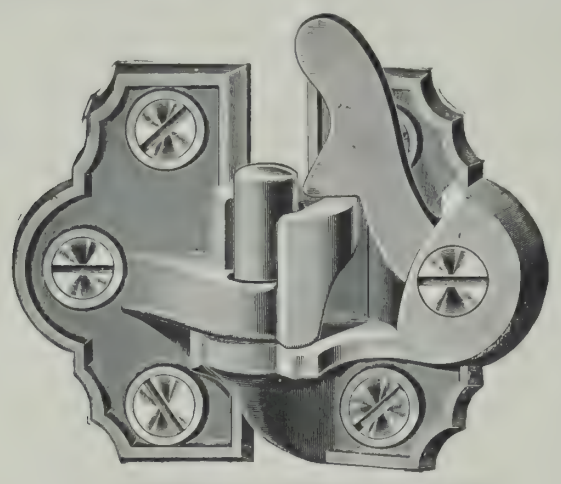


Fig. 1. STENGER NOISELESS BLIND HINGE.

explains its construction. The lever seen on the right of the hinge is designed to act as a positive lock to prevent a blind being closed by the wind. When a blind is opened the lever drops into its locking position and holds the blind open without other support, and in such a manner as to prevent any rattling. By raising the lever the blind is readily closed. The makers state that the hinge operates smoothly and noiselessly, and that on account of its not being a gravity locking hinge the breakage is entirely avoided. Fig. 2 shows an open blind with the

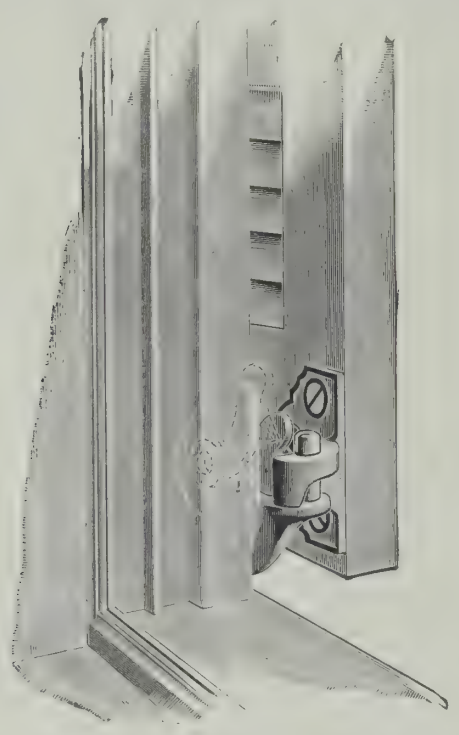
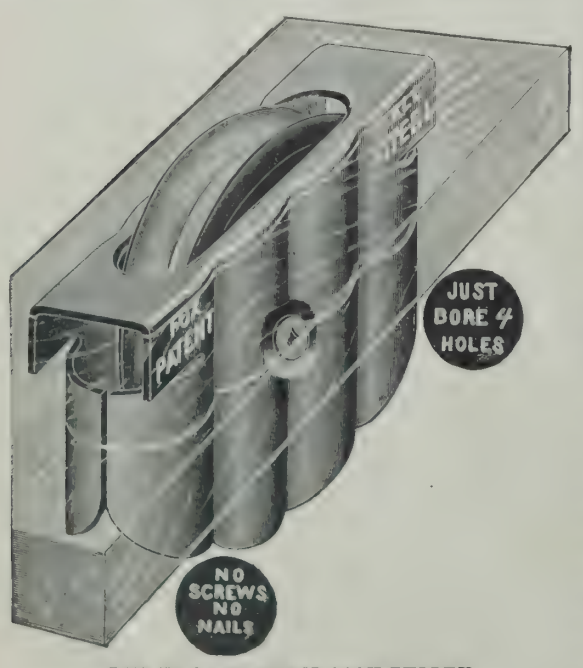


Fig. 2. BLIND HINGE ON OPEN BLIND.

hinge attached. The hinge is claimed to be well made and exceedingly durable.

STEEL SASH PULLEY.

The illustration represents an all-steel sash pulley, inserted in the wood by simply boring four holes in line, and driving the pulley down flush, the pulley casing having corrugated sides, and fitting perfectly in the mortise thus made. This improvement is manufactured by the

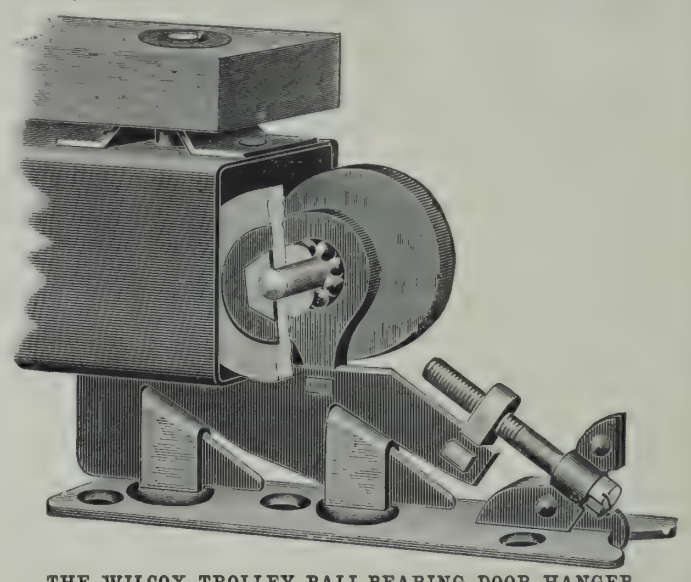


THE FOX ALL-STEEL SASH PULLEY.

Fox Machine Company, of Grand Rapids, Mich., manufacturers of best grade of wood and iron working machinery. The spurs on the four upper corners of the pulley casing cut their way into the wood, and the pulley is thus securely fixed in place without nails or screws. This is an item of saving where the construction is extensive, besides the quickness with which the lock is inserted. The Fox Company also make a quadruple bit to bore the four holes at once.

AN IMPROVED DOOR HANGER.

The illustration represents a new, strong, simple and easily put up and regulated device for hanging House Doors that has an adjustment both in the Hangers and Track, and with which both can be taken down without removing plaster or defacing door or finish. The Hangers are made entirely of steel, are fitted with Vulcanized Fibre wheels, which render them noiseless, and are equipped with the finest Ball Bearings, the cups and cones being case-hardened. The Track is formed from sheet steel into a rectangular shape by special machines, and having six longitudinal bends or corrugations, it is very rigid, firm, and no obstruction whatever can lodge in track to impede the free movement of the Hangers. Each piece is fastened to a Wood Header by three adjusting screws, and can be furnished in any length to ten feet without joint. An overhead centre stop is furnished with each set, which prevents the defacing or marring of jamb at back of doors that is caused by the old-style gravity stop. This improved device is made by the Wilcox Manufacturing Company, of Stone Avenue, Aurora, Ill.



THE WILCOX TROLLEY BALL-BEARING DOOR HANGER.

Slate Roofs.

Any one having roofing to do should send to the Bangor Excelsior Slate Company, Easton, Pa., for their 1897 pamphlet on the various kinds of slates, and how they are mined and prepared for market, and which contains, as well, full directions for the best ways of slate roofing.

"The Palliser Correspondence School of Practical Architecture," No. 239 East Forty-fourth street, New York, presents a course that is at once thorough and complete, and the tuition fee is small and in easy payments. It also suggests to the ambitious carpenter and builder, the young mechanic and others who desire a course in home study, that this school affords a good opportunity for improving themselves in this line during the evening hours.

Slag-Cement Manufacture in Germany.

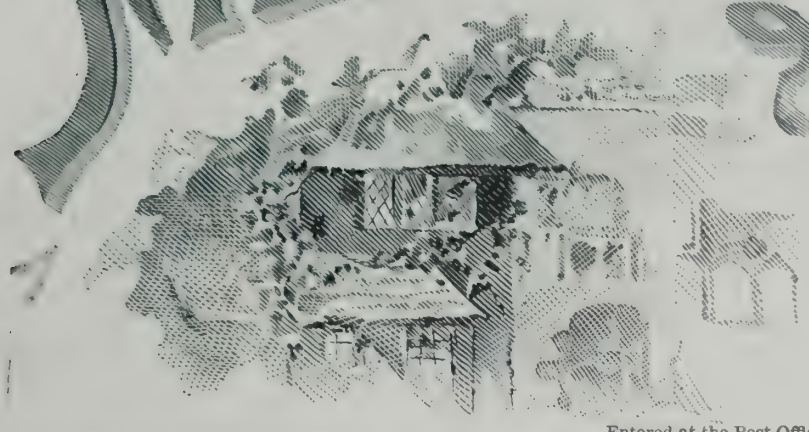
The Department of State in Washington, having recently instructed the American consuls in different towns in Germany to report on the manufacture, cost and uses of slag-cement in that country, has now published reports from Magdeburg, Dusseldorf, Frankfurt and Stettin, dealing with the subject. This cement, it seems, is made by mixing pulverized hydrate of lime with basic blast-furnace scoria, which has been granulated, dried and reduced to powder by grinding. It is used for certain purposes as a substitute for Portland cement, for it is about 20 per cent. cheaper, and, being of lower specific gravity, "spreads farther," so that, on the whole, the economy in using it is 30 to 40 per cent. It is also alleged that the mortar is more tenacious and elastic, and thus is more suitable for the foundations of bridges and other structures liable to unequal strain or to the shock of passing teams or vehicles. It was originally suggested by the excellent cement obtained from mixtures of hydraulic lime and *puzzolani*, or pulverized lava, which was first produced in Germany in 1863. Blast-furnace owners soon recognized a profitable outlet for the worthless slag they had for years been piling up on land bought for the purpose. But it was found that the slag required careful handling for mixture with the lime, and different methods of granulating and preparing it were patented, and for many years there were repeated failures to produce proper cement from slag. The essential element in basic slag for making cement is silicic acid in proper proportions, and then this must be "live" and in a condition to unite readily and firmly with the lime, while the slag must contain a due proportion of magnesia, and not an excess of some impurity which will resist the combination, and sooner or later cause crumbling or disintegration. In Western Germany there is only one small district—in the Saar Valley—where slag of perfect quality is produced, and here the slag-cement manufacture is concentrated in the hands of two firms. This cement seems to be regarded with some suspicion by engineers, who will only use it when they know where, by whom, and from what materials it has been manufactured. When of good quality it may be used with advantage where the work will always be moist and protected from the sun. It is also used for paving tiles for courtyards, etc., and for this purpose is mixed with fine Rhine gravel and quartz sand and subjected to pressure. The manufacture offers no serious mechanical difficulties, but requires sound technical knowledge and good workmanship.

METAL WINDOW FRAMES AND SASH.

With the necessity that exists for an entirely fireproof construction of the very high buildings now becoming so common in our large cities, the obvious weakness of any building in which the old style of wooden window frames and sash is employed has been much commented upon. To do away with this great defect, and furnish frames and sash of galvanized iron or copper, or a combination of both, has been the field of the Standard Metal Window Company, of New York and Chicago. The accompanying illustration represents one of their standard metal windows, in which the architraves and pilasters are formed in sheet metal. The frame should be set and the wall built around it, whereby the anchors, adapted to to secure the edges, may be laid to the joints of the wall, and the interstice between the wall and metal pilaster be filled with mortar to make air-tight. The company own many patents on metal window frames and sashes, and are equipped with special machinery, by means of which to turn out work at the lowest possible price, with absolutely perfect workmanship, also making any special design required. Builders and architects should send for their catalogue.

FIREPROOF WINDOW METAL FRAME AND SASH.

SCIENTIFIC AMERICAN.



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NEW YORK, MAY, 1897.

THE

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BUILDING EDITION.

ESTABLISHED 1885.

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TRADE SCHOOLS AND THE APPRENTICESHIP SYSTEM.

It is an encouraging sign of the times that the country at large, and the technical press in particular, are taking up the question of industrial and trade schools in thorough earnest, and that there seems to be a general consensus of opinion that, although the institutions of this kind which we already possess are doing excellent work, they are inadequate to meet the wants of the large army of young men which is yearly entering the various industrial callings.

At the same time, it is significant that many articles and letters are being written from time to time, calling attention to the fact that some of the industries which require the exercise of special skill and intelligence are complaining of the scarcity of skilled workmen. We are confronted with the curious anomaly of employers with vacancies which they cannot fill, and an army of unemployed seeking for work which they are unable to obtain. The situation illustrates the truth of the saying that "there is always room at the top," and there is good reason to believe that a wider application of the apprenticeship system, and an increase in the number of trade and technical schools, would do much to reduce the numbers of the unemployed.

The progress of civilization, while it provides increasingly for human wants, at the same time serves to create new wants. This is particularly true of all industrial development, and it is safe to say that there is no country where these self-created needs have been so quickly recognized and met as in America. In regard to the question under discussion, however, we have been somewhat remiss, for, while our ingenuity and resourcefulness have called into existence a system of shops, factories, tools, etc., which cannot be surpassed, we have to a certain extent neglected to provide for that all-important element, "the human factor." In our endeavor to provide tools for the workman, it is a question whether we have not been in danger of forgetting to provide workmen for the tools. The rapid advance which we have been making in science and art has tended to remove the dividing line between them. The definition of our school-boy days, which told us that science meant the knowing and art the doing of a thing, is only half true in these later days, for, whilst the scientist may know without being capable of doing, the artisan cannot always do without first knowing. Modern industrial progress has set a discount upon the man who is merely a handy, all-around workman, and has put a premium upon the man who, to a thorough mastery of his particular craft, has added an intelligent grasp of its scientific principles, and who is able to understand a complicated drawing or make his own sketches with chalk and draughting board.

There is a sense in which the intelligence of the average American has been a hinderance to the growth of the apprenticeship system on a large scale. The farmer's son, for instance, who has learned to repair a plow, to replace a broken bolt, or pin in a reaper, or even forge a link in a chain, has acquired a facility with the tools which makes him unwilling to bind himself in an apprenticeship of greater or less duration. He prefers to enter a machine shop, and pick up the speed and execution, which go to make a good mechanic, by dint of observation and industry. But, though it is true that mere ingenuity and adaptiveness are valuable to a workman in the present day, they will not carry him so far as they formerly did, and the industrious boy of average ability who goes through the instruction of a trade school, or a course of apprenticeship, will find it less difficult to obtain employment than the boy who, with perhaps a greater natural talent, has picked up his knowledge in the knock-about experience of half a dozen various shops.

The German nation has worked out the trade-school problem in its usual scientific and practical manner, and it is the systematic training of the German artisan that enables him, when he comes to this country, to obtain work almost at the first application. The past record of the American artisan proves that, if he were subjected to the same technical training, he would invariably capture the best positions and be intrusted with the best class of work in his own country. As an instance of the thoroughness with which the Germans have carried out their system, we may mention that in the various trade schools of Berlin there were in 1895 no less than 336 teachers and nearly 9,000 students, and that the city alone expended in this work the sum of $209,112.

The question of trade schools is intimately related to that of apprenticeship, and there is certainly no necessary antagonism between them. The one is supplementary to the other. The trade school furnishes the theoretical knowledge, and the experience in the shops gives to the beginner dexterity and speed in handling his tools. The decline of apprenticeship in this country has been largely due to changed social conditions: the apprentice of former days was bound to his master, lived under his roof, and ate at his board, and there was certainly a strong color of servitude that went with his position. But, while there were abuses under the old system, there was much good in the roof idea; and we shall do well in these days to follow out the principles upon which the system was founded, arranging the details to suit modern conditions.

A RESIDENCE AT SOUTH ORANGE, N. J.

We present herewith in this issue, as a subject for colors, and on page 76 a residence which has been erected for Mrs. Walter McCoy, at Hartford Road, South Orange, N. J. The engravings present an excellent design for a country house, as it combines a most attractive exterior and an interior arrangement that is complete, with large rooms well lighted and ventilated, and conveniently located one with the other. The lines of the elevations are simple and the detail is well executed in the colonial style of architecture. The bay windows and chimney at end are important features, while the broad, spacious piazza at front adds much to its pleasing appearance. The underpinning is built of brick laid up in red mortar in a neat manner. The exterior framework is sheathed and then covered with clapboards on first and second stories and shingles on third story. It is painted colonial yellow with white trimmings. The roof is covered with a bluish-black slate. Dimensions: Front, 58 ft. 6 in.; side, 40 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The square hall, in centre of house, is trimmed with ash and finished natural. The floors are of hard wood. The walls are tinted an old terra cotta color and are finished with a wood cornice. The parlor is treated in old yellow. The walls are rough plaster finish and are treated in a similar color but of a darker shade and in an effective manner. The fireplace at side is built of brick with facings and hearth of pale yellow tiles, and a mantel with columns of excellent designs. The library is finished in cherry. It has bookcases and window seat built in, and an open fireplace with blue tiled facings and hearth, wrought iron trimmings, mantel and over-mantel rising to ceiling. Dining-room is also finished in cherry. It has ceiling beams, a dado, and walls treated in old reds, a hardwood floor, and a fireplace built of brick, with hearth and facings of same, and mantel with columns supporting a shelf and canopy in the Dutch style. The kitchen and pantries are trimmed and wainscoted with yellow pine and furnished with the best modern fixtures complete. The second floor contains four bedrooms, closets, den and bathroom. This floor is trimmed with white pine and is finished natural. The bathroom is wainscoted and fitted up replete. The third floor contains five bedrooms. Cemented cellar contains furnace, laundry and other necessary apartments. Mr. John R. Baker, architect, Orange, N. J.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

ST. JOHN'S EPISCOPAL CHURCH, LARCHMONT, N. Y.

We present herewith in this issue, on pages 73 and 77, an engraving illustrating St. John's Episcopal Church, at Larchmont, N. Y. The design is very unique in its character for a village church, and the style, with its graceful lines, is quite appropriate to its surroundings. It is treated in the modern English rural style, and is well adapted for the purpose for which it is intended. It is constructed throughout of rockfaced granite, from local quarries, and of a soft bluish-gray color, which is quite in contrast with its silvery gray shingled roof. The porch at front entrance opens into vestibule, which has a tiled floor, and a stairway leading to the tower. At the left of entrance are doors leading into auditorium, which is finished and furnished throughout with oak in a very handsome manner. It has a wainscoting of narrow beaded oak, and the ceiling is beamed and ribbed, with the spaces filled in with similar ceiled work. This auditorium (34 x 70) has a seating capacity of 280. The chancel (21 x 32) has a massive paneled wainscoting, and an altar of oak, elegantly carved. This altar was the gift of the Duchess of Marlborough. The pulpit and lectern are of brass, of handsome design. One of the most striking features are the memorial windows, the centre one of which was the gift of W. C. Hunting, in memory of his mother, while the one at the left was the gift of C. H. Murray, and the one at right by Mrs. W. L Neilson. The sacristy (16 x 19) and choir room are conveniently located, with outside entrances thereto. The cellar contains the usual heating apparatus and other apartments. Mr. Walter C. Hunting, architect, 10 West Twenty-third Street, New York. Cost $15,700 complete.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

PATENTS.

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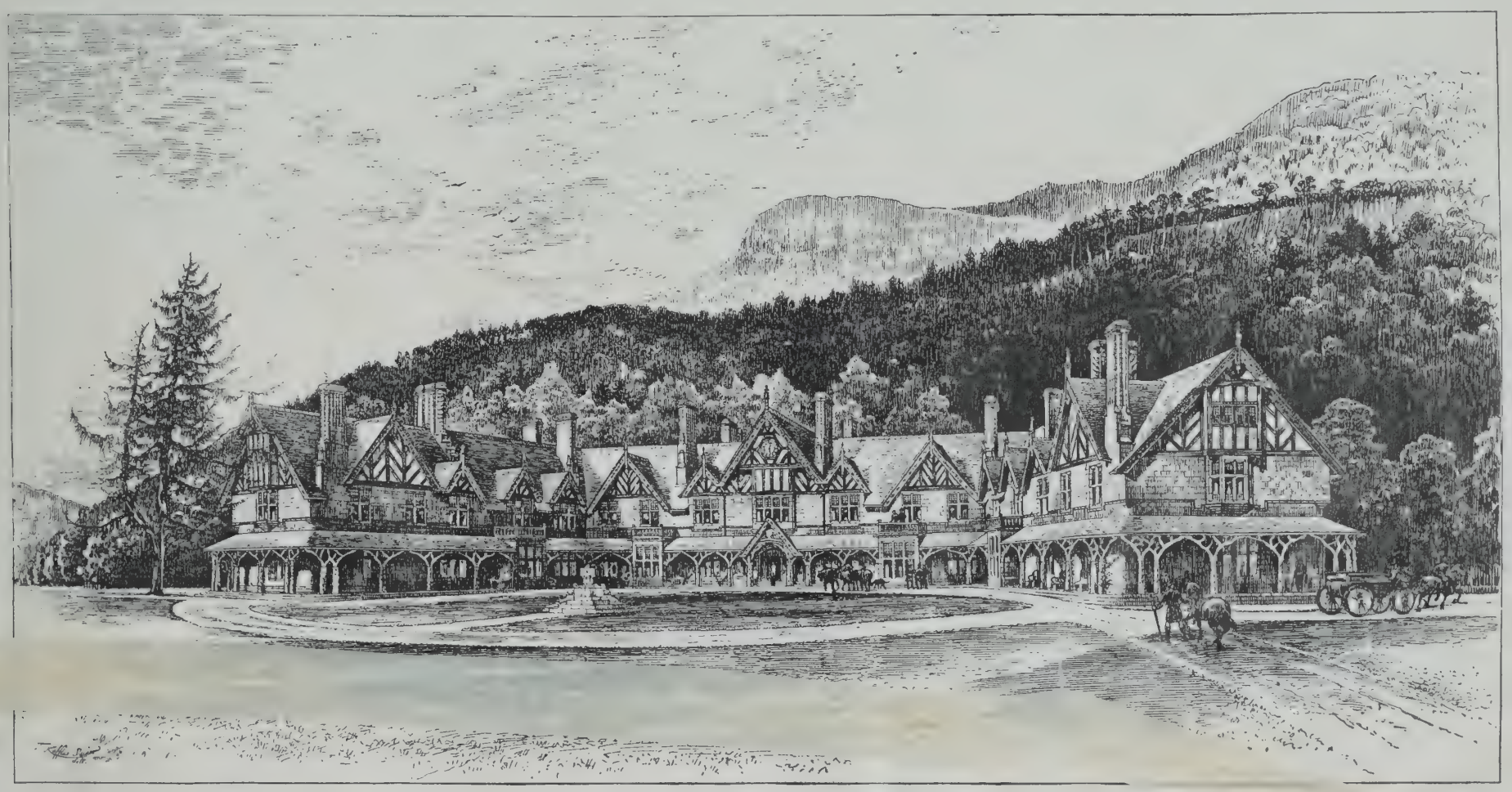
MAR LODGE, DEE SIDE, ABERDEENSHIRE.

We present as an illustration, on page 75, in this issue, the new Highland residence which has been recently built for the Duke of Fife, whose house in Mar Forest was destroyed by fire in 1895. The walls of the house are built of a light coral granite found on the estate. The timber is also native, being of Scotch fir from the Forest of Mar. The upper parts of the gables are of half-timber construction, the spaces between the timbers being plastered, and harled with an outer coating of crushed quartz from the Cairngorm Mountains. The roofs of the building are covered with English-made red tiles. Electricity is used for lighting, as well as warming the interior. In the centre of the building are a hall and grand staircase. By these access is obtained to the public rooms, including a large dining-room and a smaller dining-room. There is a spacious drawing-room, a large billiard-room, and twenty-six bedrooms, and also bedroom accommodation for twenty-five man servants and forty maid servants. The stabling accommodation consists of thirty-six stalls, with two harness-rooms attached, two carriage-houses, and messroom and scullery. The architect is Mr. A. Marshall Mackenzie, of Aberdeen. The fire-proof flooring is to be on the Stuart granolithic system, carried out by Stuart's Granolithic Pavement Company, Limited, of Regent's Dock, Limehouse, London. The main steel girders are from 10 ft. to 13 ft. 5 in. apart, and span from wall to wall. On their lower flanges rest the granolithic fire-proof ceilings. These latter span intervals of 18 ft. by 13 ft. 5 in., and are only 4 in. in thickness. They will carry a load of 5 cwt. per square foot. The steel girders are to be incased with granolithic, which is to be turned up 8 in. along the walls, thereby making the ceilings perfectly watertight. In the case of a fire, should water be turned on, it will stand to the depth of 8 in. all over the floors. Thus there will be complete isolation between the floors, and it will be rendered impossible for fire to reach from the ground floor to the upper floor, or *vice versa*. The system is the invention of Mr. P. Stuart, F.R.S.A., whose family were the builders of Balmoral Castle.—From the *Building News*.



MAR LODGE, DEE SIDE, ABERDEENSHIRE.

A COTTAGE OF LOW COST AT TUXEDO PARK, BALTIMORE, MD.

Our engraving and floor plans, on page 84, represent a cottage erected for J. C. Watt, Esq., at Tuxedo Park, Baltimore, Md. The design is extremely simple in treatment, and yet the absence of the many objectionable features, only too frequently in evidence in houses of low cost, make it worthy of publication. How much more tasteful the plain Tuscan column, when correct in detail, than the excessively turned posts of the Queen Anne style so frequently used, irrespective of their propriety! Then again, how much better the simple cornice above than if same was heavy and supposedly supported by the really meaningless brackets, representing only the possible contortions of the scroll-saw! The entrance door, with its square of glass above and the three panels beneath, is in marked contrast to the door usually used, because the house must be built "cheap." A simple handrail, with square balusters, around porch, would be inexpensive and improve the design considerably. The plan showing entrance hall, with sliding doors to parlor, having fireplace, with marble mantel, and similar doors, of six panels, to dining-room. This room also has fireplace and mantel in corner, and a door to kitchen, having usual fixtures, and pantry, serving as passage, making a convenient arrangement of rooms for first floor. The second floor is divided into three chambers (two with large closets), bathroom, and store closet. Cellar contains hot-air heater, fuel space, etc. Dimensions: Front, 22 ft.; side, 34 ft., exclusive of front or rear porch. Heights: Cellar, 7 ft.; first floor, 9 ft. 6 in.; second, 9 ft. Foundation is of local stone, chimneys of brick; exterior framework above weather-boarded, and painted light yellow; roof shingled, and stained emerald green; gables stained yellow; sash painted white; blinds and lattice, dark green; general finish throughout, cypress. Cost $2,000, complete.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL HOUSE AT SOUTH ORANGE, N. J.

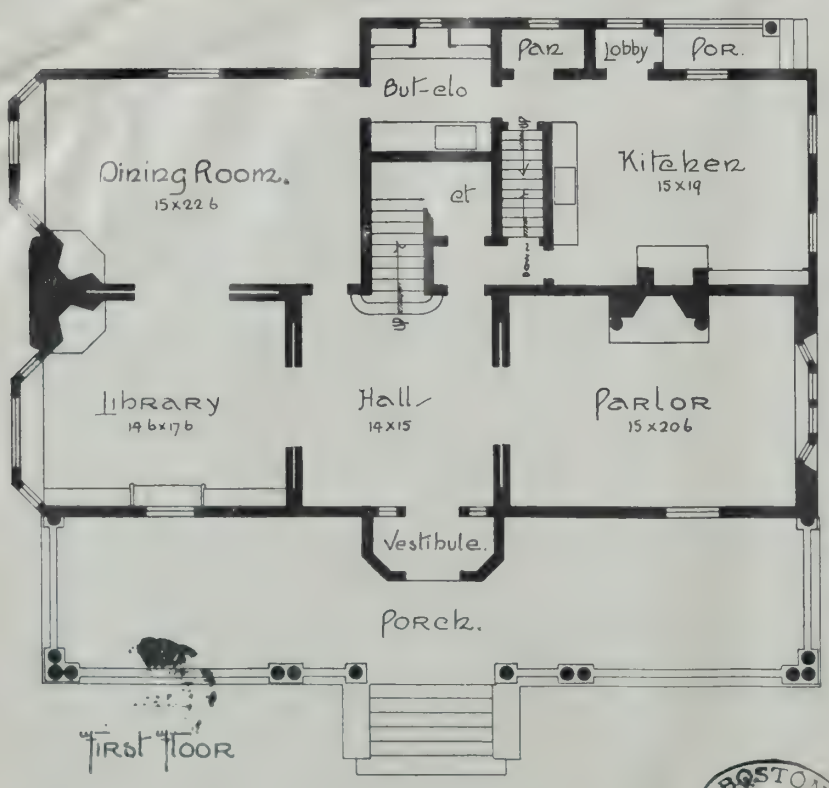
We present, on page 85, illustrations of a colonial house which has been recently erected for Ellis A. Apgar, Esq., at South Orange, N. J. The engravings present a design treated in the modern classic style of architecture, which is a good healthy sign, providing a style of a century ago. The general scheme is that of a simple building, with fluted columns rising from the stylobate to the entablature. These columns have caps of the Ionic order. The underpinning is built of brick, while the superstructure above of wood is sheathed on the exterior, and then clapboarded and painted colonial yellow with white trimmings. The roof is shingled and finished natural. Dimensions: Front, 42 ft.; side, 38 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The entrance is through a large door, with columns and windows on either side. The main hall, which is a broad, spacious apartment, is trimmed with oak. The principal feature of this apartment is the colonnaded staircase, with columns extending to ceiling, from which the stairs rise by a central run to landing, from which they divide and rise on either side to the second floor. The landing has a cluster of stained glass windows, and the combination is most effective. The parlor is treated in china white, Dresden style, and contains an open fireplace with tiled hearth and facings, and a dainty mantel with mirror and columns. The library is trimmed with red birch, and it has an open fireplace with tiled trimmings, and bookcases built in on either side, with leaded glass doors. The dining-room is a very attractive apartment, and it is trimmed with oak. It has a fireplace built of Tiffany brick, with hearth and facings of same, and a carved mantel with columns extending to ceiling; the overmantel has cabinets with leaded glass doors. The floors are of oak and polished. Kitchen and pantry are trimmed and wainscoted with whitewood, and are fitted up with the best modern improvements complete. The second floor is trimmed with cypress and finished natural. It contains a large open hall, four bedrooms, large closets, and bathroom. The bathroom is wainscoted and fitted up with porcelain fixtures and exposed plumbing. Third floor contains four bedrooms and trunk-room. Cemented cellar contains furnace, laundry, and other necessary apartments. Mr. Charles P. Baldwin, architect, Prudential Building, Newark, N. J.

Our engravings were made direct from photographs of the building taken especially for the SCIENTIFIC AMERICAN.

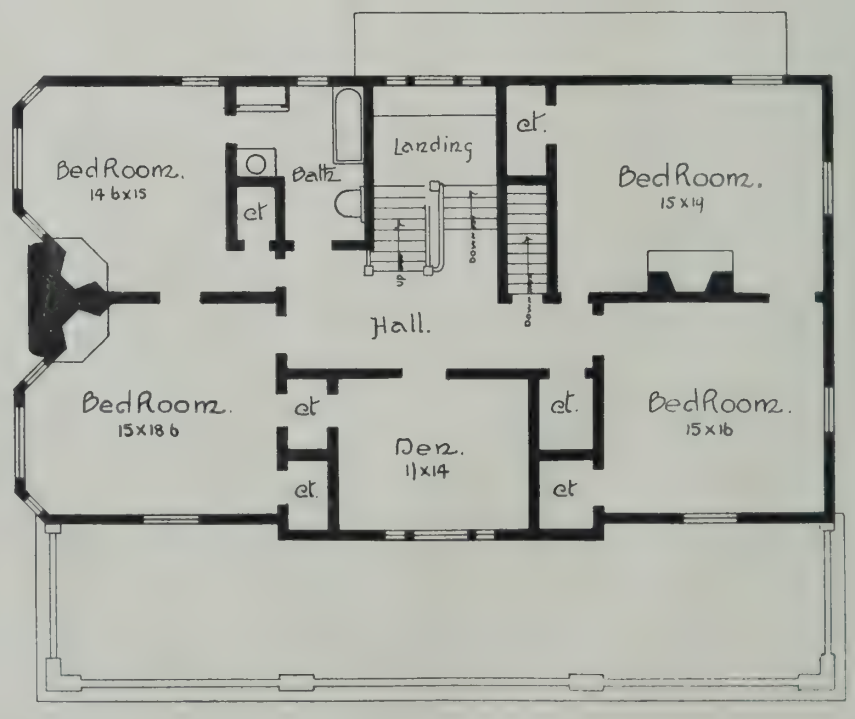
A MODERN RESIDENCE AT MONTCLAIR, N. J.

We present herewith in this issue, on page 83, a modern residence recently erected for Mr. Eames at Montclair, N.J. The design is an excellent one for a suburban house, and although treated in the modern American style, it is of colonial detail, and it comprises many good features. The piazza, at front, is nearly square in form, and has massive colonial columns supporting roof and balustrade over same. The underpinning is built of rockfaced red sandstone, laid up in a neat manner. The superstructure above is constructed of wood, and the first story is clapboarded and painted bottle green, with ivory white trimmings. The second story is covered with shingles and stained with a mottled green and brown effect. The roof is shingled and stained a mottled green, the whole harmonizing one with the other. Dimensions: Front, 48 ft.; side, 51 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The main hall is trimmed with oak, and it contains a paneled wainscoting and an [illegible] staircase, with newel posts rising to ceilings, balusters and rail, and a broad landing, lighted effectively by a cluster of stained glass windows. The floors are of hardwood throughout. The parlor is treated in white and gold, and is quite in harmony with its grayish-green walls and grayish-yellow ceiling. The fireplace is furnished with yellow tiles, brass trimmings, and a carved mantel. The living-room is an apartment furnished in a striking and pleasing manner, with paneled wainscoting, nook with divan, and columns extending to ceiling, and a broad, open fireplace built of brick, with hearth and facings of same, and a massive wood mantel. The dining-room is trimmed with oak. The fireplace has a tiled hearth and facings, brass trimmings and a mantel supported upon ornamental columns. The kitchen and pantries are trimmed and wainscoted with white pine finished natural, and are furnished complete with the usual modern fixtures. The lobby and side entr[illegible]nce are a convenience. The second floor contains library, three bedrooms, and two bathrooms. The library and two bedrooms have open fireplaces, with tiled hearth and facings and mantels. The bathrooms are wainscoted and furnished with porcelain fixtures and exposed plumbing. The third floor contains three bedrooms, guest-room, and trunk-room. Cemented cellar contains furnace, laundry, and other necessary apartments. The late Mr. George W. da Cunha, of Montclair, New Jersey, was the architect.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.



First Floor



Second Floor.

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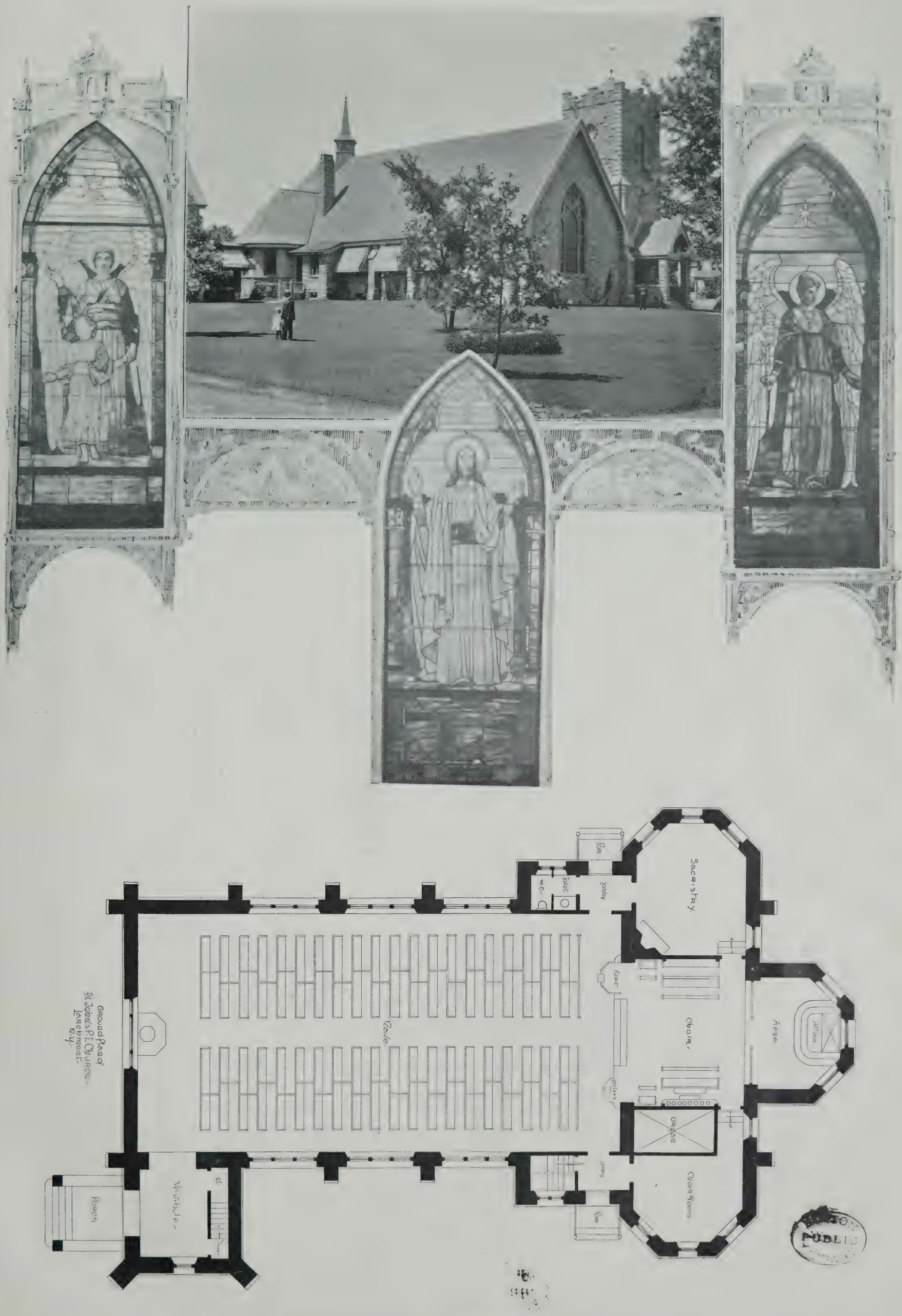
A RESIDENCE AT SOUTH ORANGE, N. J.—See page 74.



ST. JOHN'S EPISCOPAL CHURCH, LARCHMONT, N. Y.—See page 74.

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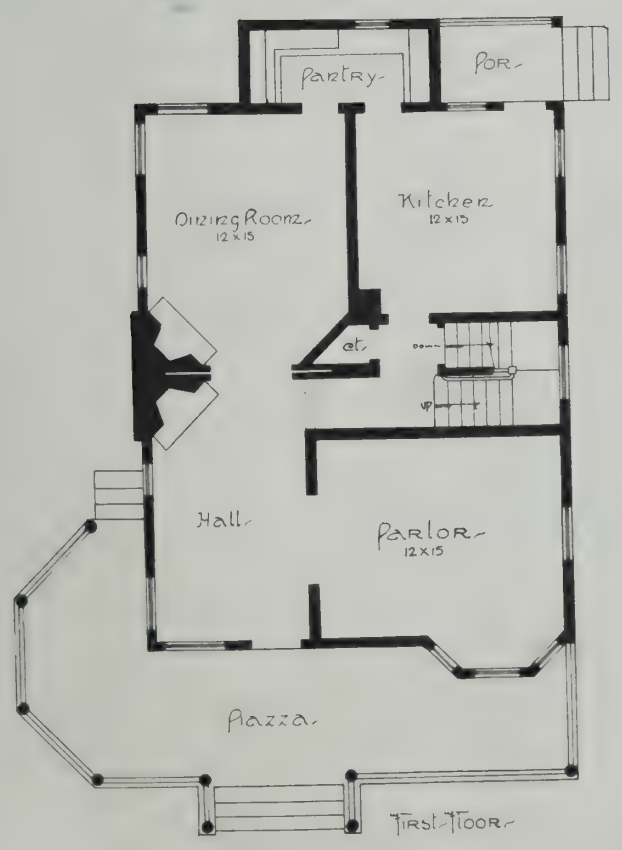
A RESIDENCE AT PRIMOS, PA.—See page 88.



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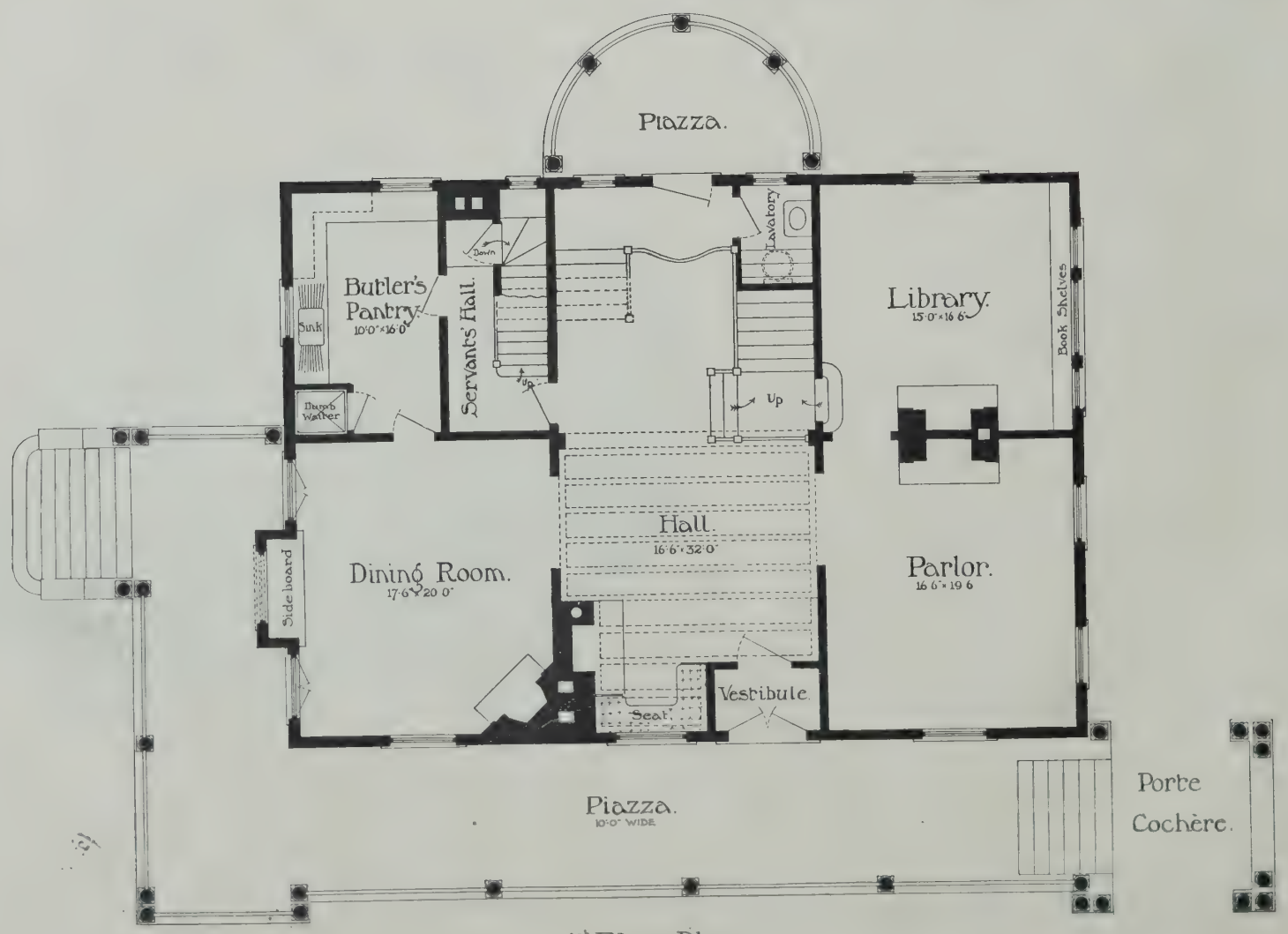
A COTTAGE OF MODERATE COST AT BRIDGEPORT, CONN.—See page 88.



1st Floor Plan.

A RESIDENCE AT LARCHMONT, N. Y.—See page 88.

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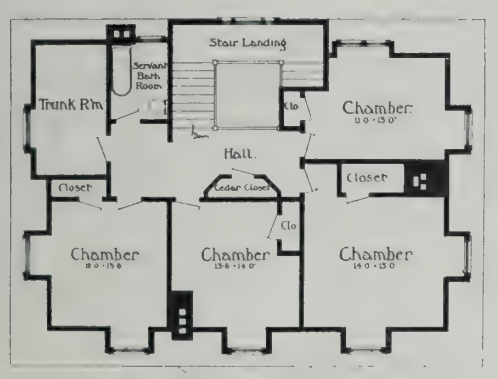
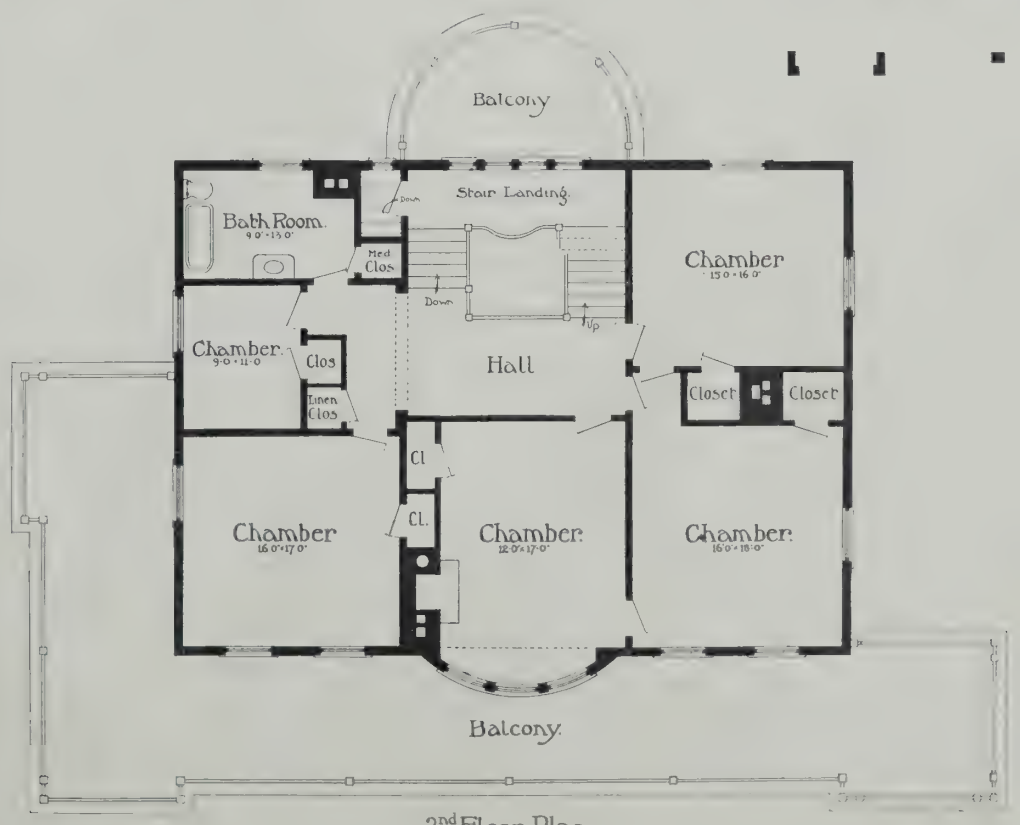


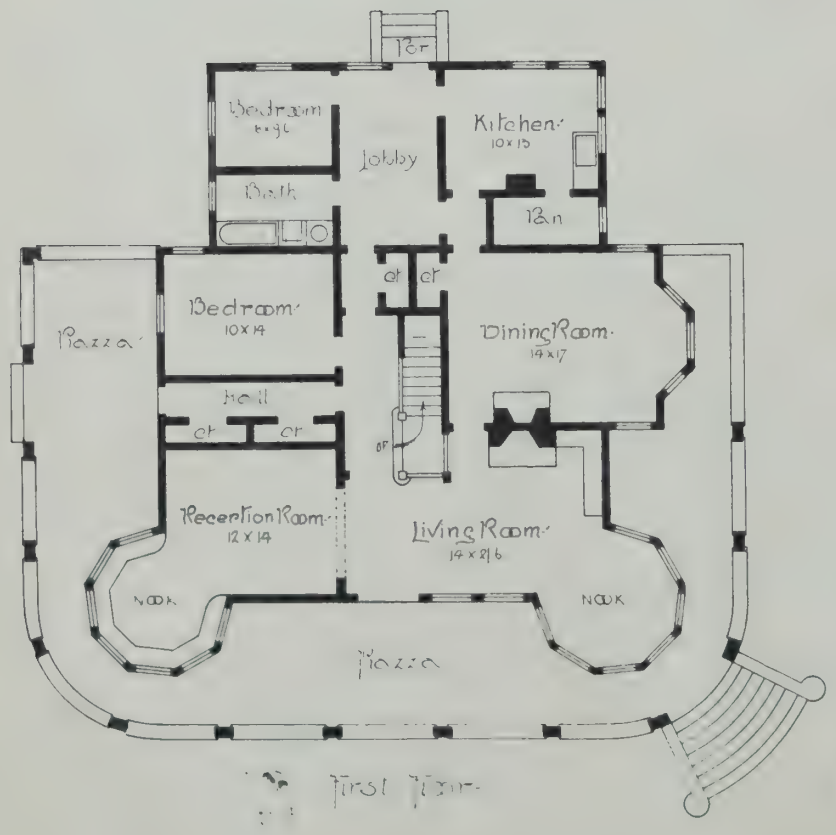
3rd Floor Plan.

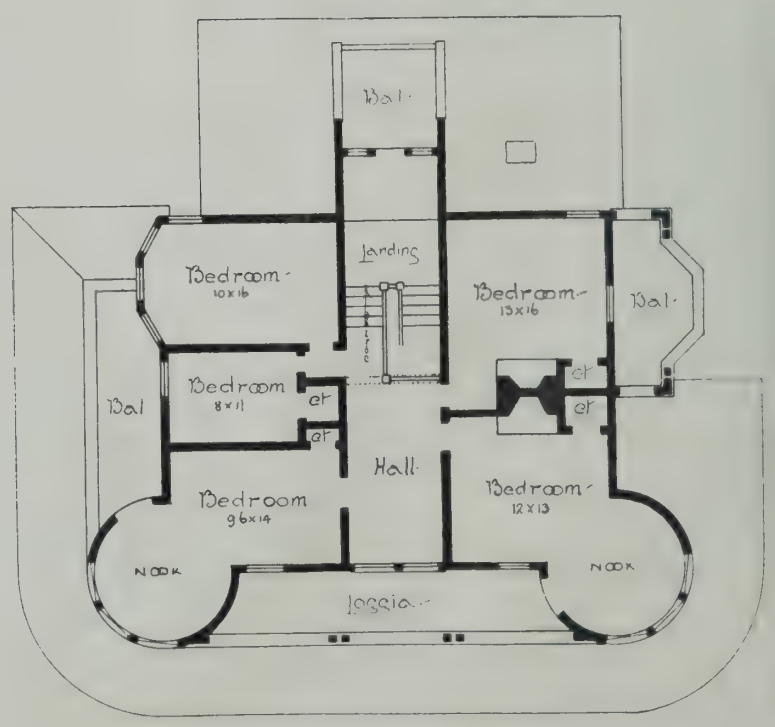
Cellar Plan



2nd Floor Plan

A RESIDENCE AT LARCHMONT, N. Y.—See page 88.





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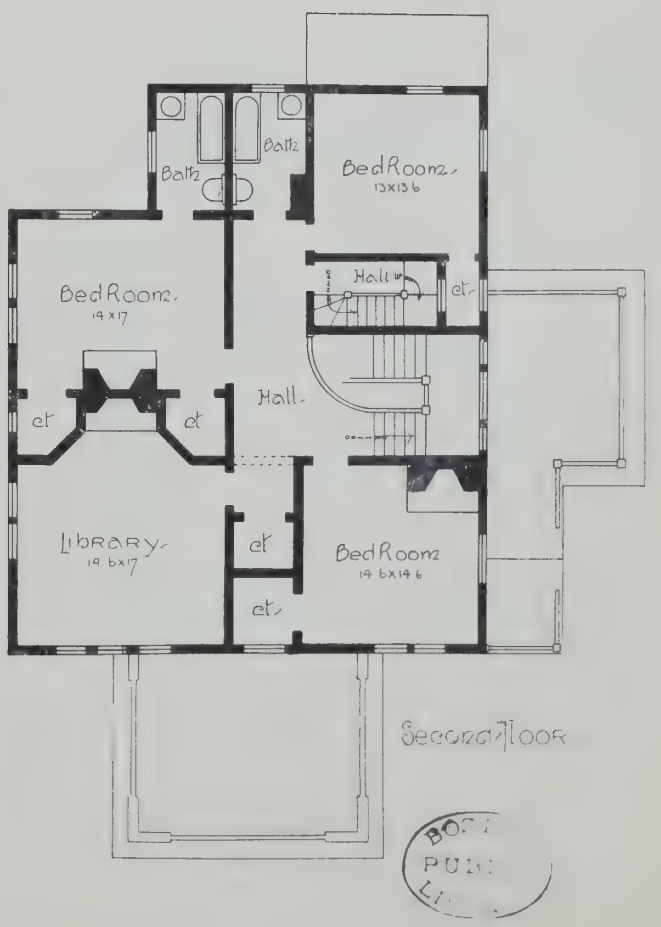
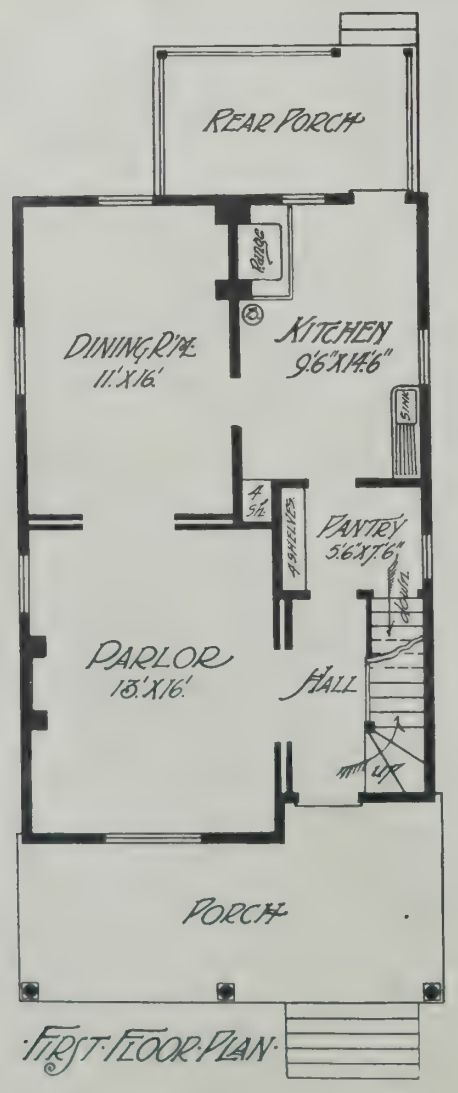
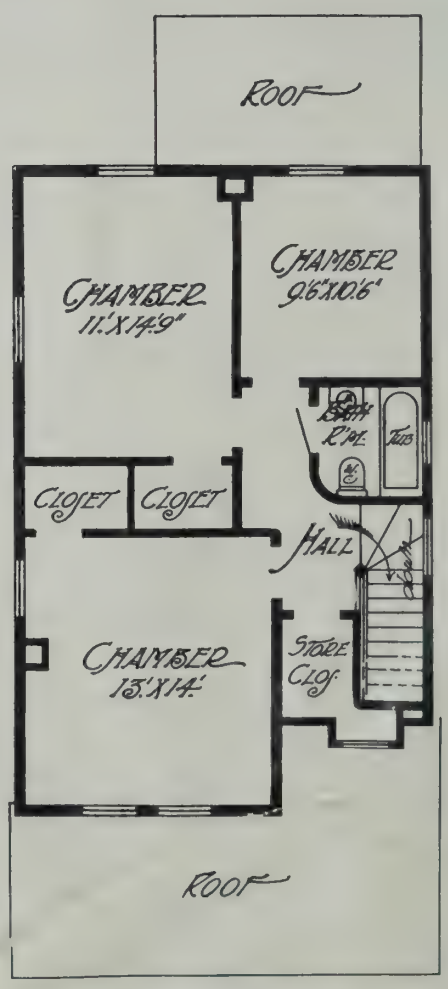
A SUMMER HOUSE AT GREAT DIAMOND ISLAND, MAINE.—See page 88.



A MODERN RESIDENCE AT MONTCLAIR, N. J.—See page 75.



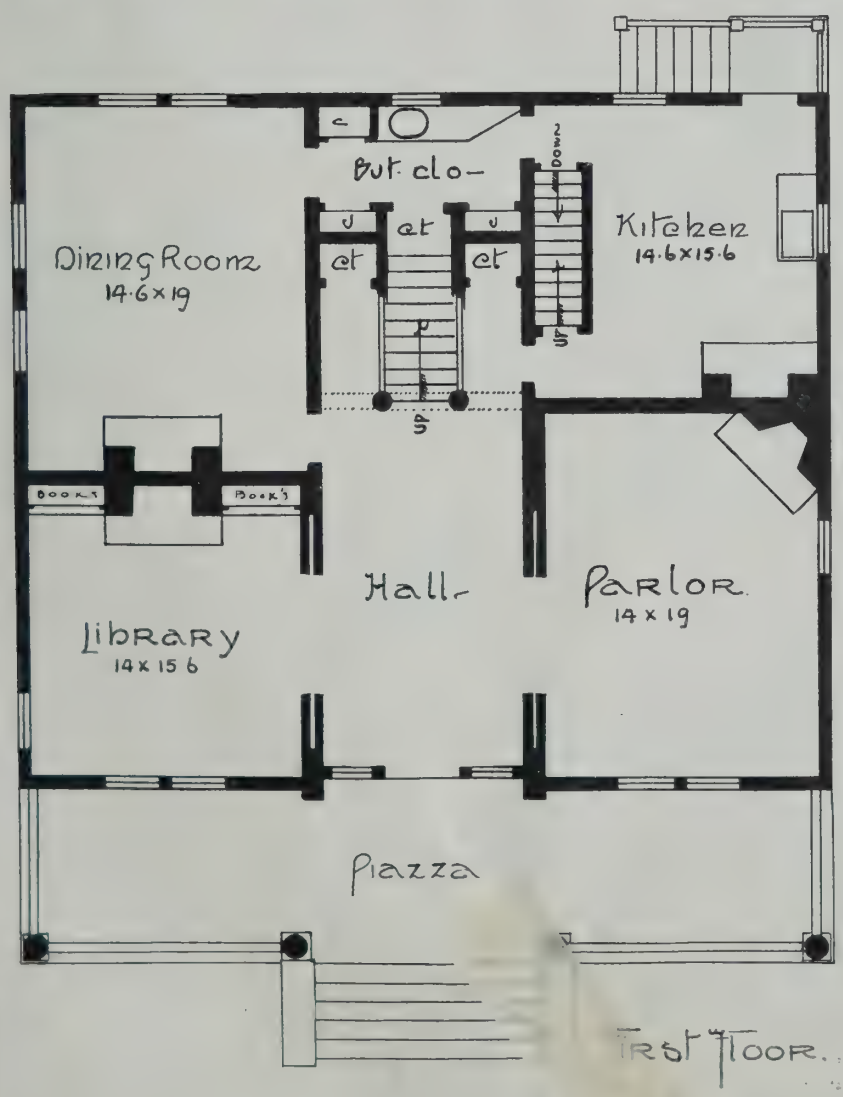
FIRST FLOOR PLAN.

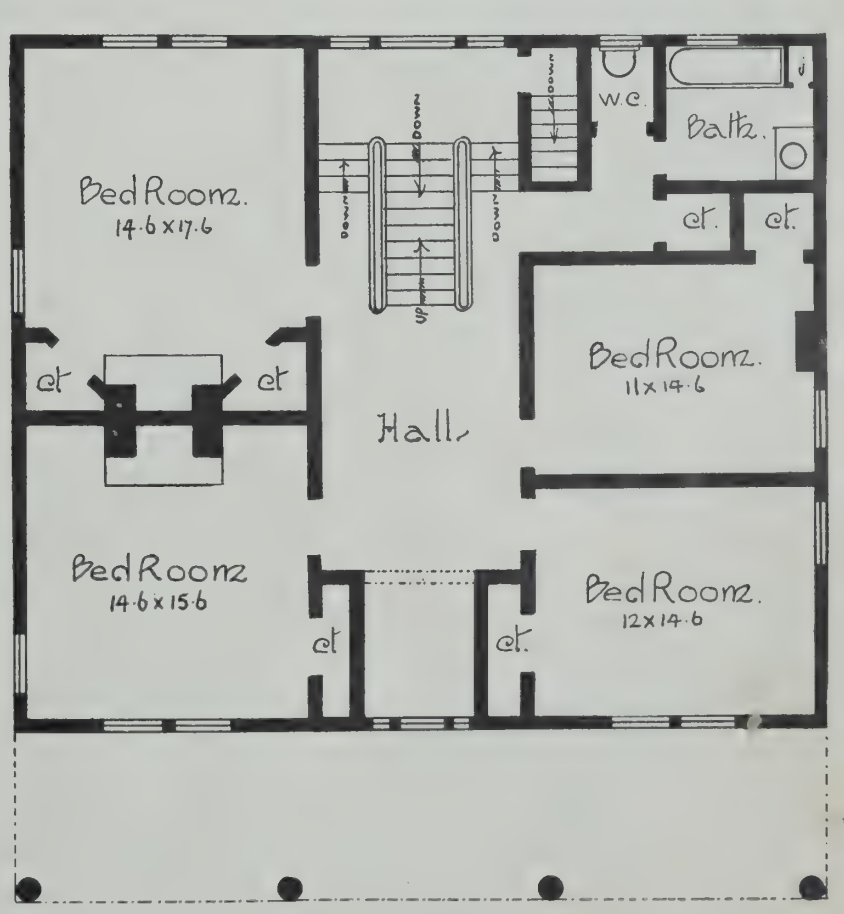


SECOND FLOOR PLAN.

BOSTON PUBLIC LIBRARY

A COTTAGE OF LOW COST AT TUXEDO PARK, BALTIMORE, MD.—See page 75.





A COLONIAL HOUSE AT SOUTH ORANGE, N. J.—See page 75.

INTERIOR VIEW[illegible]IEW YORK STATE CAPITOL BUILDING.—See page 87.

1. View of Senate Chamber. 2. View sh[illegible]rade, Grand Western Staircase. 3. View showing Chimney-piece in State Treasurer's Room.
[illegible]ng Carved Capitals, Grand Western Staircase.

NEW YORK STATE CAPITOL BUILDING.

We present herewith a perspective view of the State Capitol Building at Albany, N. Y., together with interior views of the Senate Chamber (Fig. 1), grand western staircase, and chimneypiece in the State Treasurer's room.

The perspective view represents the State Capitol Building as it will appear when finished, with the approach and tower complete.

The eastern approach and terraces are now under way, and are nearing their completion. This approach provides for an entrance way, to both the first and second stories, through an arcade in the first story, and through a loggia over the arcade in the second story, and also a driveway from street to street. It is built of finely wrought granite from the Hallowell quarries. The first run of sixteen steps is 100 feet broad, constructed on convex curves, the radius of each step being increased from the lower to the upper step, and landing on a broad platform. Both the corbels and pedestals at the end of the platform are richly embellished with carving. From this platform there are sixteen additional straight steps, landing on a platform which is on a level with and forming a part of the terrace, and from which the next run of steps starts to the second story. The roadway passes beneath an archway, forming a porte-cochère, to the first story of the Capitol. This archway is twenty-four feet in width, by fifty-seven feet along the roadway, and is divided into three bays with granite groined ceilings. Steps lead to a platform at level of second story and the openings of the loggia in the second and principal story of the eastern façade, which are divided by heavy piers, with eight columns to each, much attention being given to the designing of the capitals at piers. There is some very excellent carving on this approach, representing "Justice," "Law," "Science and Art," and the "Industrial Arts." The entire portion to the approach and the centre section of the eastern façade, when completed, will add great dignity and prominence to the structure.

The next great work in progress is the grand western staircase, which is conceded to be the grandest staircase in the world. It is a triumphal masterpiece, and constitutes a monument to the State architect, Hon. Isaac G. Perry, whose skill, artistic taste and untiring efforts have so greatly contributed to the erection of this magnificent pile. It will be seen from the illustrations on page 86 (Fig. 2), and in the continued illustrations in the following issue, together with this description, that this staircase is laid out, and so far executed, on a very broad plan. The work of construction was commenced March 22, 1884, and continued at intervals as appropriations were available, and it is hoped with the recent appropriations that it will be fully completed at once without further delay. The actual time expended on the work has been six and one-half years.

The structure occupies a space 76 ft. 10½ in. north and south, by 69 ft. 10½ in. east and west. The height from the tiled floor in the first story to the top of the cornice is 105 ft., and thence to the summit of the glazed dome 14 ft., making a total of 119 ft. The east and west main corridors of the western section of the building extend along past the great staircase in the first, second, third and fourth stories, except on the west side of the second story, where the entrance lobby is located, connecting with all four of the corridors, which are embellished with columns and pilasters, with carved caps and string courses. From this lobby, or from the eastern corridor, the vistas up through the staircase are extensive and interesting, as the intricate ornamentation of the arches, groined ceilings, columns, ornamental caps, and the balustrades, present a most charming and varied appearance, and give a good idea of the great work.

The plan consists of broad central runs of steps, starting in the corridors, and extending through the centre opening, between the cylindrical piers, flanked with columns in the east and west corridors on first story, in the east and west lobby on second story, and in the east and west corridors on third story. The steps and balustrades of the central run of steps curve outwardly from the centre line of steps, increasing the length of the lower steps, which are also constructed on convex curves, and extend up a little more than one-third of the height of each story, landing on central platforms. These platforms are flanked by short runs of stairs on two sides at right angles to the north and south corridor walls, landing on platforms from which are four runs of steps, two on each side along the walls next to the north and south corridors, thereby making four landings, two in each corridor of the second, third and fourth stories. By this plan, the construction of the staircase is such as to form four liberal-sized wells, through which light is admitted through the glazed dome, and also through the windows in side walls.

The central portion of the stairs is supported on eight bearings, resting upon moulded granite bases, and extending up from the foundations at the angles of all the platforms, through three full stories and part way up from the third to the fourth story. The whole inner area of the fourth story above the pedestals, from the platforms at the junction of the run of steps, is open, leaving the whole space within the outer colonnades free up to the glazed dome, which spans the whole area, admitting a flood of light down through the staircase. From the top of platforms are pedestals extending up above the same to the height required to receive the balustrades in the first, second and third stories, and reaching up above the platforms between the third and fourth stories the height required to receive the balustrades, and statues to four of the pedestals, and carved caps to the other four.

Clustered columns with moulded bases rest upon the pedestals, and are embellished with carved caps (Fig. 4), by which mode of construction eight ornamental architectural supports are formed, thereby making continuous vertical piers at the eight points where strength is required to carry the central sections of the stairs, and by this means of construction the inner portions of the structure are permanently supported. There are also eight pilasters and piers attached to the north, south, east, and west walls, in each story, upon which rest the upper springs of the graceful elliptical arches, carrying the upper runs of steps which land in the corridors of the first, second, third and fourth stories, and by which, together with the lower stages of arches, the various runs of steps are supported. These arches divide the elliptical groined ceilings, and also the groined ceilings under all platforms, into forms of parallelograms.

VIEW OF NEW YORK STATE CAPITOL BUILDING.

The arches, referred to as supporting the various runs of steps, are most graceful, being elliptical in form, sweeping up from the carved caps a distance far below the platforms, and from the corbels constructed in the walls of the second and third stories, and the arches are as nearly parallel as practicable to the run of steps. The lower ends of the arches, which support the central runs in the second and third stories, spring from carved corbels of interesting designs. The four arches springing from the corbels, and carrying the centre section of the second run of steps, and also the four arches carrying the centre section of the third run of steps, are curved outward, representing the perfection of science in the construction of an arch curving two ways.

On the east side of the first story are carried corbels under the arches supporting the centre runs of steps, representing "Justice" on one, and "Liberty" on the other. The emblems are surrounded by richly carved foliage. The corbels supporting the third story arches which carry the centre run of steps on the east bear the words "Excelsior" on one, and "E Pluribus Unum" on the other, and on the west side is a quotation from the Declaration of Independence, the letters carved upon a disk surrounded by natural foliage, and near the carved head of Thomas Jefferson between the caps of the columns on the pier just below. The corresponding corbel, supporting the opposite arch, represents a shield bearing the stars and stripes, surrounded by carving representing laurel, and near the carved head of George Washington.

Particular attention has been given to all corridors of the four stories, and each façade is divided into three openings, between the corridors and the staircase, divided by piers of liberal proportions, embellished with columns set in the angles of each pier. The piers and columns are ornamented with moulded bases and carved capitals, Romanesque in character, with the introduction of enough natural foliage to relieve the monotony, and expressing a most spirited feeling. The north and south corridors in the third story are completed.

The lower section of the walls is of the same materials as employed in the stairs, and the walls of the upper section are faced with Indiana limestone, the deep beams with moulded angles and the paneled ceilings being of the same material.

The floors in the first story are of Vermont marble, with a border of red Vermont slate, producing a pleasing contrast. The material employed in the construction of the staircase is mainly of Corse Hill freestone, which is of a soft, light red color, and was selected on account of its uniform close texture and solidity, together with its suitability for carving, and being of a color best adapted for the greater portion of the work. Tests show that it is capable of carrying 7,000 pounds to the square inch. The steps are of Medina sandstone from quarries near Albion, N. Y., reddish brown in color, and of very close texture, and regarded as one of the best known materials for steps, from the fact that it will resist wear almost equal to granite.

The lintels in second story are of Bay of Fundy polished red granite, while the lintels in third and fourth stories, and the beams that support the paneled stone ceilings, are of what is known as Stony Creek granite, a deep reddish brown, producing, when polished, varied shades, and a charming contrast with the Indiana limestone, which is of a light drab color, resting upon beams, and, together with the walls and corbels upon which the beams rest, produces a harmony of color. The moulded bases upon which all the supports of the stairs rest in the first story are of Fox Island granite.

The illustration, Fig. 3, presents the chimneypiece in the State Treasurer's room, which is 13 ft. 2½ in. in width, and 12 ft. 10 in. high, and consists of two round columns and two pilasters, coupled on either side of the fireplace, which, together with the frieze, are of polished Scotch granite. The columns and pilasters rest upon moulded Tennessee marble bases, standing on granite plinths. The facings and jambs on either side of the fireplace, the linings back of the columns and pilasters, the shelf, and the returns around the ends to the walls, are of highly polished Tennessee marble. The lintels over the fireplace, the capitals to the columns and pilasters, and the crown and bed moulds of the cornice, are of Indiana limestone. The space in overshelf is provided with a clock, surrounded by a richly carved moulding, and on either side of the clock are carved figures, of exquisite workmanship, representing Night and Morning, set in recessed panels, and surrounded by foliage. The shelf is supported by a richly carved ledge, and the workmanship has been exquisitely executed, the whole presenting an imposing and beautiful appearance. The contrast presented by the material of varied colors produces a pleasing whole. This chimneypiece stands upon a broad, heavy hearth, of Medina freestone, extending the whole length, and projecting fourteen inches beyond the columns and pilasters.

(To be continued.)

A RESIDENCE AT PRIMOS, PA.

We present herewith, on page 78, in this issue, a residence recently erected for Mrs. Caroline S. Bye, at Primos, Pa. The engravings afford an attractive and graceful design for a suburban house, with many excellent features on the exterior, and an interior arrangement which is quite complete. The underpinning and part of first story are built of rock-faced stone from the local quarries, of a grayish color, and neatly pointed up in gray mortar. The remainder of the building is of wood, and is covered on the exterior with plain sawed cedar shingles. The roof is covered with long split cypress shingles. Dimensions: Front, 40 ft. 6 in.; side, 44 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The main hall is trimmed with oak, and it contains an ornamental staircase, with broad landings, a large coat closet under same, and a side carriage entrance. The parlor, which is a very attractive room, is trimmed with chestnut. It has a pleasant corner window seat and an open fireplace, trimmed with tiled hearth and facings, and a mantel of excellent design. Dining-room, and the remainder of interior, are trimmed with chestnut. This dining-room has a buffet, built in, and a large china closet, amply fitted up with the best modern conveniences. The kitchen and laundry are wainscoted and fitted up replete. The laundry is used as a summer kitchen. The second floor contains three large bedrooms, well lighted and ventilated, a bathroom, furnished with porcelain fixtures and exposed nickelplated plumbing, and a store-room which is used for a sewing-room and clothes press. The third floor contains two guest-rooms, one servants' bedroom, and trunk-room. Cemented cellar contains laundry, furnace, and other necessary apartments. Mr. Edward S. Paxon, architect, 729 Walnut Street, Philadelphia, Pa.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A COTTAGE OF MODERATE COST AT BRIDGEPORT, CONN.

We present herewith in this issue, on page 79, a modern cottage which has been erected for James Wilson, Esq., at Bridgeport, Conn. The engravings present an attractive design, of colonial treatment. It is a difficult matter to secure a design with the combination of pleasing elevations, well-arranged plans, and at a moderate cost, but in these particulars the architect has been successful. The underpinning is built of local rock-faced granite. The chimney is constructed of quarry faced buff brick. The first story is covered with clapboards and painted a soft gray color, while the second and third stories are shingled and stained a silver gray. The trimmings are painted cream white. The roof is shingled and stained moss green. Dimensions: Front, 27 ft. 6 in.; side, 37 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first floor, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. The interior throughout is trimmed with cypress and finished natural. The parlor has a bay-window thrown out, and is well lighted. The hall has an ornamental staircase, with turned newels, balusters and rail, a hardwood floor laid in narrow widths and polished. This hall and dining-room have open fireplaces, built of mottled buff brick, with hearth and facings of same, and neat, ornamental mantels. The kitchen is wainscoted and furnished complete with the best modern fixtures. The second floor contains four bedrooms and bathroom, the latter being wainscoted and furnished complete. Third floor contains two bedrooms and ample storage room. The cellar is divided into furnace, vegetable and other apartments. Cost, $2,800, complete. Mr. Edwy E. Benedict, architect, 140 Grand street, Waterbury, Conn.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A RESIDENCE AT LARCHMONT, N. Y.

We present in this issue, on pages 80 and 81, a residence recently completed for Mr. Charles A. Singer, at Larchmont Manor-on-the-Sound, N. Y. It is of the American style, with colonial detail and trim, and is very pleasing both on the interior and exterior. The underpinning is built of rock-faced stone laid up in a neat manner. The building above is built of wood, covered with shingles, and left to weather finish a natural silvery gray color, with white trimmings. The roof is covered with similar shingles and finished natural. The chimneys are built of buff brick. Dimensions: Front, 61 ft. 6 in.; side, 36 ft., not including piazza. Height of ceilings: Cellar, 8 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 9 ft. The grand spacious hall running through the centre of the house is trimmed with white pine and treated in china white, harmonizing nicely with the rich, deep red of the walls. These walls have a paneled wainscoting, and the ceiling is heavily beamed. At the left of entrance is a pleasant nook with paneled divan, and an open fireplace trimmed with tiled hearth and facings and mantel. The staircase is an ornamental one with spindle balusters and fluted newel post supporting wrought iron candelabra. A toilet is located conveniently under stairs. The parlor is treated in ivory white, and it contains an open fireplace with Mexican onyx facings, tiled hearth and a mantel of special design with columns and mirror. The library is trimmed with dark oak, and at one side of room are bookcases built in, over which is a cluster of stained glass windows, shedding a pleasant light over the apartment. The fireplace has tiled trimmings, wrought iron fittings, and mantel of excellent design. The dining-room is trimmed with oak, and it has a paneled wainscoting, a buffet built in and handsomely carved, and a fireplace with unglazed tiled hearth and facings and mantel. The floors are of hardwood, laid in narrow widths and polished. The butler's pantry is a spacious one with drawers, shelves, cupboards, sink, and dumb waiter to kitchen. There is also a stairway and hall leading to second story and to kitchen in basement. This basement contains kitchen, servants' dining-hall, laundry, pantries, store room, coal and wood cellars, and a room containing the heating apparatus. The basement and cellar are most complete, and the apartments are trimmed and wainscoted with Georgia pine and provided with the best modern fixtures complete. The second floor is trimmed with white pine and finished in white enamel. It contains a large open hall, five bedrooms, with large closets, and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains four bedrooms, trunk-room, servants' bathroom. This floor is also finished in white enamel. Mr. Frank A. Moore, architect, 123 East Twenty-third Street, New York.

Our engravings were made direct from photographs taken specially for the Scientific American.

A SUMMER HOUSE AT GREAT DIAMOND ISLAND, MAINE.

We present in this issue, on page 82, a most unique summer dwelling which has been recently completed for C. J. Chapman Esq., at Great Diamond Island, Portland, Me. The building is erected on cedar posts, with stone footings. The superstructure is built of wood, with the exterior framework covered with shingles (cedar), and left to finish their natural reddish brown color. Roof shingled and painted red. The elevations are very attractive, and they have many good features, including a broad, well-shaded piazza, towers, balcony, loggia, and bay windows. Dimensions: Front, 50 ft.; side, 50 ft., not including piazza. Height of ceilings: First story, 10 ft.; second, 9 ft. The woodwork used in trimming the interior is of yellow pine and finished natural. The walls throughout have a wainscoting three feet high; the space above this point and the ceilings are covered with burlap, put on with excellent effect. The living-room is provided with a paneled divan, ceiling beams, forming deep panels, and an open fireplace, built of brick, with facings and hearth of same. The staircase is furnished with newel posts, spindle balusters, and a broad landing, with window seats. The reception room is finished similar to living-room. Dining-room is provided with a fireplace, same as the one already described. The first floor also contains a bedroom, servants' bedroom, bathroom, kitchen and its apartments, furnished with the usual fixtures respectively. The second floor contains a large, open hall, large closets, and five bedrooms. The fireplaces are furnished with the usual fixtures. The attic gives ample room for storage. The cellar being inclosed same as main story, ample space is provided for storage. John Calvin Stevens, architect, Oxford Building, Portland, Me. Cost $4,500 complete.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

Transom Lights.

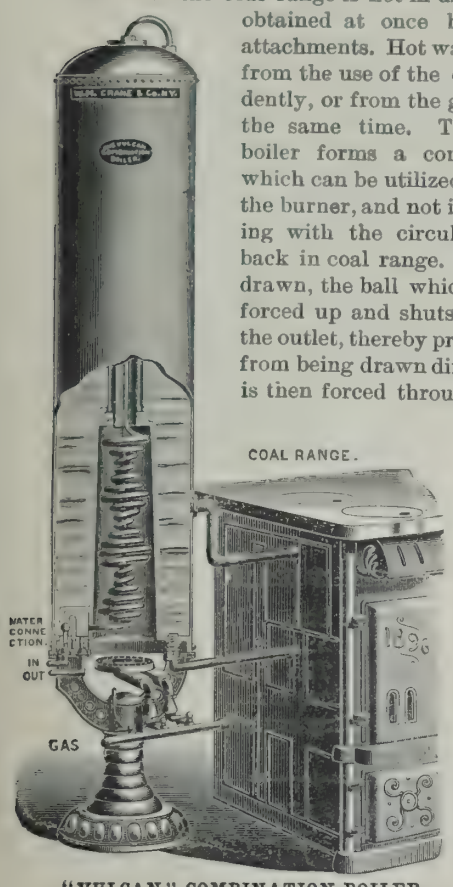
It is customary to make all transoms or fan-lights the same thickness as the doors below them, and to leave the rebate in the stile the same as for the door. This is a mistake, we think, so far as outer doors are concerned, for where the sashes are the same thickness as the door, and there is no difference in the rebate, it follows that no stops can be put around the transom light to make it weather-tight and hold it in place. It is suggested that the sashes be left the same thickness as the doors, as they always look more in keeping with the surrounding finish this way than if thinner, and that the rebate above the transom bar be one inch deeper than the rebate for the door, which would admit of a one-inch stop being planted all around the transom sash when in place. This, it is suggested, would make a much better job and a much tighter one than the usual way of finishing about a transom light.

The writer is aware that there are other methods of fastening and finishing transoms than those mentioned, but as they are only adopted in the most expensive buildings, they are purposely overlooked here, and the more general methods are discussed. This matter of purposely "stopping" a transom light may not appear a startling one, but it is one of those little things that is deserving the attention of those workmen who desire to make the best of everything they do.

With inside transoms the conditions are different, as in most cases they are so arranged as to be adjustable, to open and close at will. There are cases, however, where the system suggested in the foregoing would be just as well suited to the inside transom as to the outside, and where it can be applied, it is our opinion it ought to be, unless special arrangements to the contrary are made. This not only applies to the transoms with square heads, but to semicircular and elliptical transom lights, or transom lights of any shape.—*The National Builder.*

AN INSTANTANEOUS HEATER FOR THE RANGE BOILER.

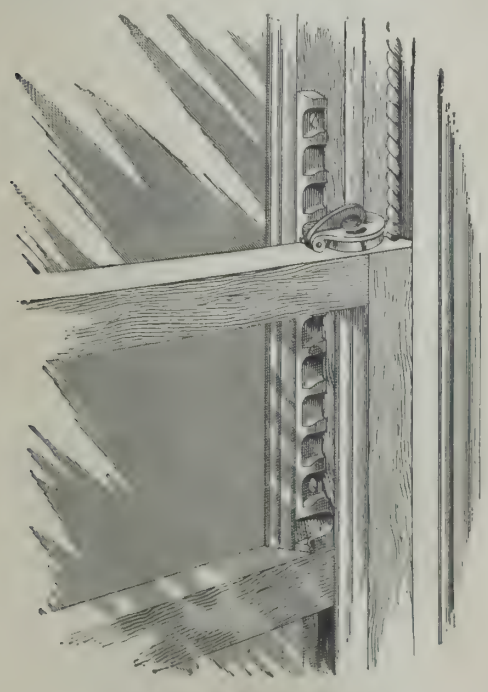
The want of hot water for the bathroom and for other uses during the warm weather of summer, when the range fire is so often dispensed with, is often a serious inconvenience, but with the improved combination boiler, shown in the accompanying illustration, the difficulty is removed. It is a boiler adapted for use with the ordinary coal range, in the usual way, but so constructed that when the coal range is not in use, hot water can be obtained at once by lighting the gas attachments. Hot water may be obtained from the use of the coal range independently, or from the gas, or from both at the same time. The coil within the boiler forms a complete water back which can be utilized at will by lighting the burner, and not in the least interfering with the circulation to the water back in coal range. When hot water is drawn, the ball which closes the inlet is forced up and shuts off the passage to the outlet, thereby preventing cold water from being drawn direct, as all the water is then forced through the coil connecting at the top of the boiler and becomes heated in the circulation of the coil. A perfect circulation is obtained whether gas or coal is used for heating, being independent in either case and at the same time neither one interfering or checking the other. The coil is made of half inch seamless copper tubing and extends the full length of boiler, being inclosed in an iron casing which confines all the heat from the gas burner close to the coil; and all products of combustion can be carried off from the top of boiler with a three inch pipe connecting with any flue. This new combination boiler is made by Wm. M. Crane & Co., New York, makers of a large line of gas appliances for cooking, heating and manufacturing. With this heater, water enough for a bath may be obtained in fifteen minutes at any time; and, on account of the rapidity with which the water is heated, the manufacturers have not, thus far, found it necessary to make more than one size, which is of thirty gallons, of galvanized iron. The hot water may be drawn from any part of the house, in the usual way, in three or four minutes after the gas is lighted.



"VULCAN" COMBINATION BOILER.

AN IMPROVED SASH LOCK.

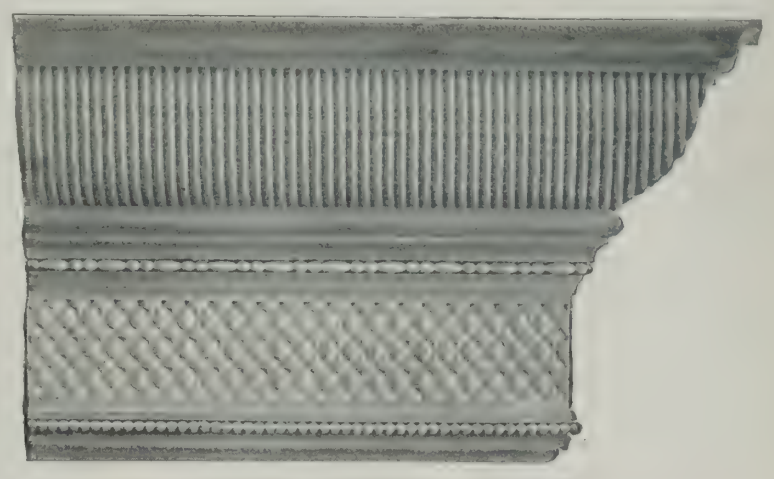
The illustration represents a recently patented sash lock adapted to lock windows open or closed, and which cannot be picked or pried loose. The cut shows the sashes locked at an opening of six inches. This sash lock is manufactured by Irving Elting & Company, Saugerties, N. Y. In locking the open window it has peculiar merit, holding the sashes snugly in the frame, that owing to swelling of the sashes, or an imperfect balance, the meeting rails cannot be brought flush, a defect that is entirely overcome with this lock by simply raising keeper plate sufficiently, no underlaying being necessary. It is made in the simplest and most durable manner, has no springs and cannot get out of order, special care having been observed in its design to avoid all complication and the use of small or brittle parts. Besides the keeper there are but three pieces, uniformly large at the points of greatest wear and strain, uniquely and compactly united, forming a device at once indestructible and of remarkable strength. This lock is furnished in all standard styles, and the best material and workmanship are utilized in its manufacture. Sample lock prepaid to any address on receipt of 30 cents.



THE ELTING SASH LOCK.

CARVED MOULDINGS.

The manufacture of ornamental carved mouldings, for interior and exterior use, by the use of special machinery in a thoroughly well equipped establishment, has been carried to great perfection by the Grand Rapids Carved Moulding Company, Grand Rapids, Mich. The accompanying illustration represents one of many samples of their work, as shown in their handsome catalogue. The woods employed in making the mouldings are oak, maple, birch, walnut, cherry, sycamore, ash, pine, and mahogany, the mouldings being cut in lengths ranging from six to twelve feet. The demand for the product of the company has been such that last fall it was necessary to make extensive improvements and additions to their previously extensive facilities.



A CARVED ORNAMENTAL MOULDING.

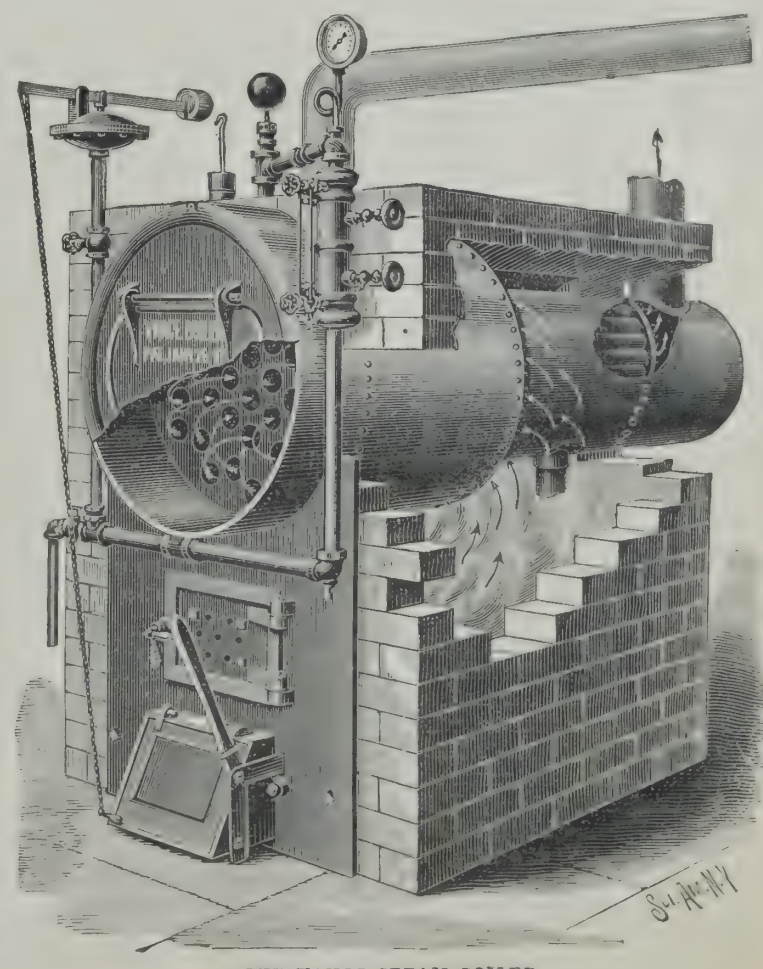
Fine Samples of Wood Finish.

The Bridgeport Wood Finishing Co., manufacturers of Wheeler's Patent Wood Filler, is repeatedly requested by architects to send them samples of wood filled with their various wood fillers and finished, so that they may see the results. They have for a long time, in one way and another, tried to satisfy this want, but lately have hit upon the idea of taking some forty-eight different specimens of wood, and finishing them with their various products and putting them into a book, which can be used for ready reference by the architects. This work will be ready for distribution within six or eight weeks, and as the supply will be limited it might be well for architects who think they could make use of such a book to send their names and addresses to the Bridgeport Wood Finishing Company, New Milford, Conn., and the book, when ready, will be forwarded to them by express, paid.

The Bridgeport Wood Finishing Company has now been before the public for many years with their Wheeler Patent Wood Filler, which has attained remarked success, its popularity steadily increasing as it becomes better known. The special point about the Wheeler filler is its adaptability for readily packing into the pores of the wood, and filling them with a permanent non-absorbent substance. Another point is its transparency, so that when varnished over the wood has its natural and latent beauty fully developed. When this company first manufactured the Wheeler filler there was call for simply a light filler for use on all kinds of wood from the darkest to the whitest holly, and an umber colored shade for use on dark woods or on any wood to somewhat darken the wood. To-day, however, the situation is entirely different. Take, for example, on oak alone; some may want the pores filled with black fillers, others with a reddish filler; some want a warm umber color, and to some extent even a green colored filler is now used. It is apparent, therefore, that the sample book which the company is getting up will be of much use and benefit to architects and others. It will probably also be well worth keeping for its beautiful specimens, and as showing what fine work is possible in this line.

A NEW AND HIGHLY EFFICIENT STEAM BOILER.

The illustration represents a boiler for which a patent has been recently issued, and which is adapted to burn equally well either anthracite or bituminous coal, effectively consuming and utilizing the heat obtained from all the smoke and gases of the fuel. It is the invention of Mr. James R. Vance, and is being manufactured by the Vance Steam Boiler Works, of Geneva, N. Y. The boiler has a large front and a smaller rear cylindrical portion, the front section being immediately over the forward portion of the fire-box, and the draught being forward through fire tubes in this section, and then rearward through the longer central portion to the chimney. The smaller rear portion through which the smoke and gases approach the chimney outlet, is completely surrounded by the flame and gases in active combustion in the furnace, thus rarefying the air and escaping products of combustion in the tubes near the point of discharge, effectively consuming the smoke and gases, and at the same time accelerating the draught. By the adjustment of a damper the combustion may be so regulated as to entirely prevent the escape of smoke and gases, thus utilizing the full heating power of the fuel. The makers of this boiler claim that they are able to effect a saving of 33 per cent. in fuel, as compared with the average results obtained by engineers. The tubes can be readily cleaned at any time without interfering with the fire, and, by removing a front plate, the grates and frame may be drawn out and new bars put in by an ordinary workman, without having to call in a skilled mechanic.



THE VANCE STEAM BOILER.

Blank Specifications.

F. Weber & Co., artists' materials, Philadelphia, handle standard blank forms of specifications, very useful to builders, contractors, and architects. They have the most complete forms, thoroughly revised, and up-to-date, as is attested by the success of the numerous editions they have passed through.

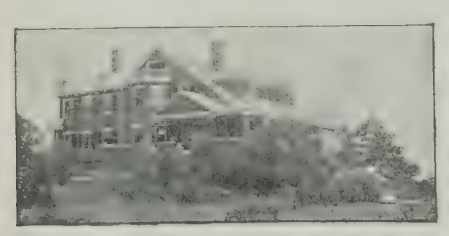
The Humphrey Manufacturing and Plating Company, of Kalamazoo, Mich., are issuing a new catalogue, containing something to interest plumbers and builders. Besides their Crescent Instantaneous Water Heaters they show a new departure in the way of an efficient circulating water heater for connection with range boilers, also a combination range boiler heater complete within itself. These heaters use *gas* as a fuel, supplying the entire system with hot water in summer, and are easily taken apart so that any sediment might be removed.

WORKS OF SAMUEL CABOT, CHELSEA, MASS.

ARTISTIC HOUSE-COLORING.

Few people realize to the fullest extent the possibilities of harmonious and appropriate color treatment for houses, although a householder's reputation as a person of taste is largely dependent upon the exterior of his house, comparatively few people ever seeing the interior. By skillful use of colors a high house can be made to look lower, or a low house higher; a large house smaller, or a small house larger; a too conspicuous house can be subdued, or an inconspicuous house brought out. It is a matter that is really deserving of great consideration, for our pretty shingled residences are susceptible to very artistic and attractive coloring, and a judicious choosing and blending of colors add much to their appearance. Glaring contrasts should be avoided, and colors should be chosen which are in harmony with the tints of nature, in the grass, the mosses, and the rocks. The cold and glossy surface that paint forms is not in tune with the soft, deep tones in the foliage, and, in addition to this, paint is not fit for the rough surface of shingles, its opaque coating spoiling their artistic effect.

A coloring material which is fit for shingles, which preserves them and gives deep, rich coloring effects, is Cabot's Creosote Shingle Stain. This stain has been in use over sixteen years, and has proved its durability in every North American climate. It was a radical departure from the hackneyed methods of outside decoration, and was pronounced by one of the oldest Boston architects the first improvement in exterior coloring in half a century. It was new, however, and it had to overcome the prejudices of generations of painting; but its artistic superiority at once attracted people of taste, and this quality, together with the well-known wood preserving properties of the creosote, soon made Creosote Stain a great and growing success. In wearing quality these stains are equal to anything that can be made with pigments. They are guaranteed to wear as long as the best paint, but will outlast most of the paint now made. Their low cost is also an important factor of their success. Not only are they cheaper than paint to buy, but they can be put on by any intelligent unskilled workman, with a broad, flat brush, much more quickly than paint can be laid on, thus saving both in time and cost of skilled labor. They are made in a great variety of colors, like moss-greens, bark-browns, silver-gray, etc., and as they are transparent the grain of the wood shows through, and the shingles look as if they grew that color. The accompanying illustrations represent houses of which the roofs have been treated with these stains.



HOUSE AT KENNEBUNKPORT, ME.
HENRY PASTON CLARE, ARCHITECT, BOSTON, MASS.

HOUSE AT CINCINNATI, OHIO.
L. F. PLYMPTON, ARCHITECT.

HOUSE AT STAMFORD, CONN.
LORING & PHIPPS, ARCHITECTS, BOSTON, MASS.

HOUSE AT CHICAGO.
GEORGE W. MAHER, ARCHITECT.

Another article of great value to prospective builders, and made by the same manufacturer, is Cabot's Sheathing and Deafening "Quilt." It is composed of a matting of cured eel-grass quilted between two layers of tough manila paper, and the long, flat blades of eel-grass crossing each other at every angle form innumerable minute dead-air spaces, which give the most perfect conditions for confining both heat and sound. Almost the happiest thought in this ingenious invention is the choice of eel-grass for the filling, for this material, when properly cured, is indestructible by decay, and is non-inflammable, only shriveling when heat is applied. The old Pierce House, at Dorchester, Mass., built in 1635, and now owned by the eighth lineal descendant of its builder, has its entire outer walls stuffed, between the studding, with loose eel-grass, and this grass is still in perfect preservation, after more than two and a half centuries. Actual

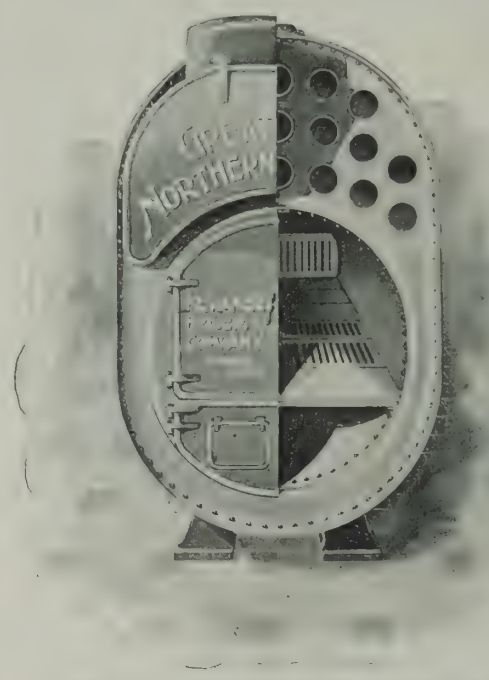
tests upon differential thermometers are said to prove that one layer of "Quilt" is equal to six of rosin-sized paper, or better than three of the best felts, and that it is more effective, more lasting, and one-half cheaper than back-plaster. It is, of course, equally effective in keeping out heat, and attics can be made comfortable with it which would otherwise be unbearable in the hot season. Its success in deadening sound is quite as great, and it is invaluable in all places where it is desired to prevent the transmission of sound from one room to another. Rudyard Kipling, who used Quilt in his house in Vermont for this purpose, says, "I have found it invaluable as a deadener of noise." These articles are made and patented by Samuel Cabot, of Boston, Mass., from whom further information and samples can be obtained.

One of the "Oldest Houses."

The oldest house in the United States is, it is claimed, the house of Dr. Carver, of St. Augustine, Fla. In it he has surrounded himself with a collection of antiquities connected with the history of Florida and the Spanish, who once ruled it, that is of itself a veritable museum. The house was built in 1562, and was occupied by monks before St. Augustine was founded. In some places the wood has rotted away, and has been renewed, but much of the old handhewn timbers and boards are still in fine preservation, and the walls and floors, made of powdered shells made into a plaster with sea water, and hardened with age, are still as firm as adamant. Some partitions in the house, and several of the doors, are the very parts taken from the cabin of a vessel found wrecked upon the shore when the house was built, and are of Spanish cedar. Dr. Carver's collection of curiosities contains relics connected with the first Spanish settlers that date back into Moorish history one thousand years ago. And, by way of proving that there is nothing new under the sun, the famous nickel-in-the-slot machine has a progenitor in Dr. Carver's collection. It is a slot machine used in the fore part of this century to deliver packages of tobacco by dropping an old-fashioned big copper cent in the slot.—*The Collector.*

A WOOD BURNER FOR STEAM AND HOT WATER BOILERS.

A boiler which has obtained a great reputation where coal is scarce and high, and which may be advantageously used around sawmills or wood-working establishments, or wherever wood is cheap, is shown in the accompanying illustration. It is made by the Kewanee Boiler Company, Kewanee, Ill. It has a very high firebox, from 17 in. to 20 in. high, above the grates, allowing the use of very large wood. The grates are listed and furnished regularly, 36 in. or 54 in. long, allowing the use of 24 in. or 48 in. wood. Only two of the grate bars (12 in.) have air spaces, the balance of the grate bars being solid, but these solid grate bars are interchangeable with the air space bars, and more air space bars



THE GREAT NORTHERN STEAM BOILER.

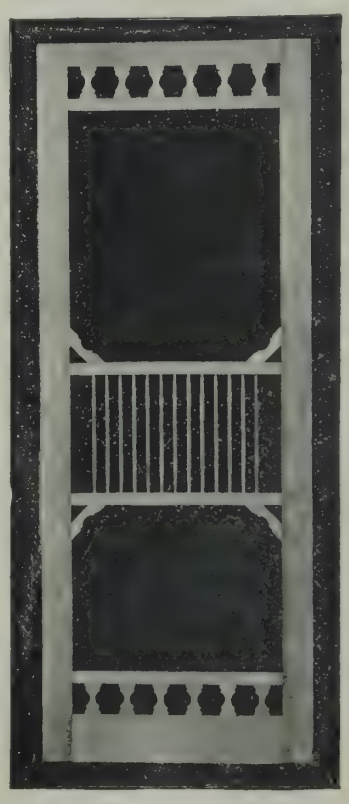
may be used instead of solid bars. The boiler can be as easily set up as a common stove, there being no screwed or packed joints to make. The boilers are made of flange steel throughout, and there is no liability of cracking, as in cast iron boilers. They are tested to 100 pounds pressure at the works.

ASBESTOS

The ground floor of the new Woodbridge building at William, John and Platt streets, New York City, has been leased by the H. W. Johns Manufacturing Company, and is now being fitted up for salesrooms, accounting department, and private offices, and the basement for stock. It is to be one of the handsomest offices in the metropolis, and with these increased facilities the company promises even more perfect service to its customers than in the past. The products of asbestos now include liquid paints, roofing, and other fireproof construction materials, heat insulating coverings for steam pipes, boilers, etc, steam packings, fireproof cements, cloth, rope, cord, twine, and numerous other articles, all bearing as a trade mark the line at the head of this notice.

A NEW STYLE SCREEN DOOR.

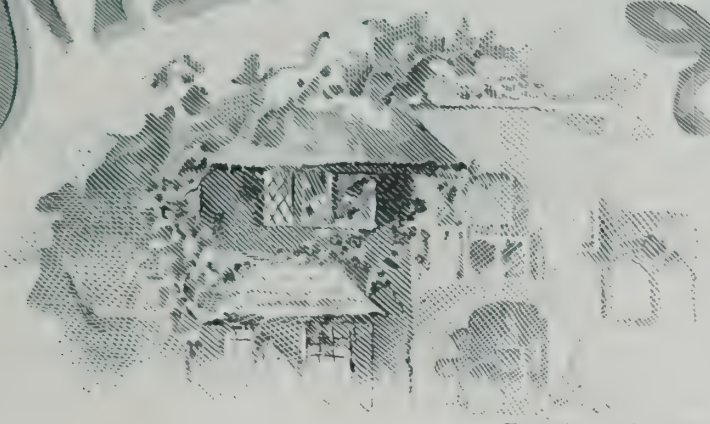
In the accompanying illustration is shown the style "M" screen door made by the A. J. Phillips Company, of Fenton, Mich. The door, aside from its ornamental features, is so made that the wire cloth in the middle and bottom of the door is protected, making it more



A PROTECTED SCREEN DOOR.

certain to keep its exact proper position and adding to the life of the door. The door is made from pine, natural finish, or painted in different colors, and may be had from the best dealers throughout the country. Architects and builders should send for a catalogue.

SCIENTIFIC AMERICAN.



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BOSTON PUBLIC

FIREPLACE IN RECEPTION ROOM OF COTTAGE AT NEW HAVEN, CONN.—See page 106.

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NEW YORK, JUNE, 1897.

THE

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BUILDING EDITION.

ESTABLISHED 1885.

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SCIENTIFIC AMERICAN, BUILDING EDITION.

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THE LIMITATION OF THE HEIGHT OF TALL BUILDINGS.

Whatever may be said, one way or the other, about the right of city councils to pass laws restricting the height of tall buildings, there is no denying the fact that such restriction is popular with the majority of city residents, and is likely to be indorsed by many municipal governments which at present do not limit the height of new buildings. The fact that the opposition to these towering structures is backed up by popular approval would lead us to expect that such opposition was based upon practical grounds; that the objectionable features were of a fundamental character, and easily seen and understood by the average citizen. For it is certain that the modern sky-scraper, considered as a mere object of popular interest, is positively attractive. It possesses, in an unusual degree, those elements of height and bulk which have always appealed to the imagination, and it is well within memory that, when Chicago began to build her fifteen and twenty story blocks, they were quoted as one of the wonders of the great Western city, and as an evidence of the skill and daring of its builders.

The cause for the erection of the modern "sky-scraper" is found in the great and steadily increasing price of land in the heart of all great cities, and in the modern tendency to concentrate business interests within the smallest possible area. It is evident that, if the owner of a city lot erects upon it a sixteen-story in place of an eight-story building, the upper eight stories are practically free from any charge for ground rent—that is to say, he practically doubles the area of his lot. If he erects a twenty-four story building, his lot area, judged by its capacity in the days of eight-story buildings, is practically trebled. There is a further substantial gain in the fact that the taller the building, the less is the relative cost of maintenance. Three eight-story buildings would require three separate electric light plants, three separate heating plants, separate elevator service, and three separate sets of employés; whereas the twenty-four story building realizes all the economy that comes from concentration of plant and labor. All the light, heat, and power plant of the three separate units is combined in one engine and boiler room, and there will be a great reduction in the necessary force of employés.

The other practical advantage above mentioned, namely, the closer concentration of business, is an immediate result of carrying up the buildings to three and four times the height that was customary fifteen or twenty years ago. A given number of offices, which would have been spread out over four city blocks in the days of the five-story building, can now be contained within the limits of a single block. It is not necessary to prove that a considerable economy of time results from such a concentration, and there is no doubt that the modern office building derives a large measure of its popularity from this fact.

But, while the lofty office building is profitable to the owner and beneficial to the user, it brings with it serious disadvantages to the neighborhood in which it stands. In the first place, that very concentration of which we have spoken becomes a serious cause of congestion in the adjoining streets. Thoroughfares which were originally laid out to accommodate a city whose buildings should be of a certain height will probably be inadequate if the size of the buildings be increased three or four fold. As a matter of fact, this overcrowding is already taking place in districts which, like lower New York and the business centre of Chicago, are already distinguished by the number of lofty office buildings which they contain.

Another, and perhaps more serious, drawback to these structures is that they shut out both light and air from the streets and the neighboring buildings. That this objection is a very real and serious one can be proved by any pedestrian who walks down Broadway, New York, from the City Hall Park to the Battery, particularly if his stroll be taken on a sunny day when a chilly wind is blowing. The moment he passes into the shadow of one of these twenty-story towers, he will realize that they produce positive discomfort. The loss of the sunlight is accompanied with strong, eddying gusts of wind, induced by the broad area of the sides of the buildings. The latter effect is particularly noticeable when a strong wind is blowing across the city, and it subjects pedestrian traffic in the neighborhood of such buildings to great annoyance.

The injury done to surrounding buildings by the shutting out of light and air constitutes another grievance against the excessively tall building. Offices which formerly were abundantly lighted are now compelled to use artificial light, and for this inconvenience no recompense whatever is made. In an age which is, if anything, too artificial already, it is deplorable that the very day should be turned into night, and that any one citizen should possess the power to shut out the free light of heaven from his neighbor.

Lastly, there is the objection to the tall building, on the ground that architecturally it is exaggerated and grotesque. No skill on the part of the architect can overcome this defect. It is true that the great amount of thought and care which has been devoted to the design of the fronts of some of the later buildings has done much to relieve the blank towerlike effect which marked the earlier buildings, but the result in the best of these buildings is never attractive. If architectural embellishments are used, they become indistinguishable in the upper stories, and the merits of the design as a whole are lost, because the width of the streets never permits the spectators to stand at a sufficient distance to appreciate it.

The question is one between the interests of the individual owner and user and the interests of the city and the citizens at large. There is no doubt that it will ultimately adjust itself on lines of compromise which will be just and equitable to both. The limitation of height should vary according to the necessities and special conditions of each city. New York, shut in as it is upon the narrow strip of Manhattan Island, should be granted a loftier coping line than an inland city, which can expand its business limits indefinitely on every side, and, while there should certainly be an immediate check put upon the erection of twenty-five story structures, care should be exercised not to run to an opposite extreme and hamper the city's development by ill-considered restrictions.

A COUNTRY RESIDENCE AT MANCHESTER, MASS.

We present herewith in this issue, on pages 98 and 99, a country residence recently completed for Senator James McMillan, of Detroit, Mich., at Manchester, Mass. The engravings present an excellent design for a country house, with spacious piazzas and a large number of good-sized rooms, well lighted and ventilated, and comprising all the best modern conveniences for a well appointed house. The illustrations present a good idea of the site upon which the building is erected, showing the rugged coast and its commanding view of the Atlantic Ocean. The design is well executed, and, although its lines are square, they are sufficiently broken to give it a pleasing and attractive appearance. The underpinning is built of rough field stone laid up at random. The superstructure is built of wood, and covered on the exterior with shingles, stained with a dark brownish green effect, with cream-white trimmings. The roofs are shingled. Dimensions: Front, 102 ft. 6 in.; side, 52 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 9 ft. The main hall, a grand apartment, is trimmed with oak, stained and finished in a darker shade, and is provided with a paneled wainscoting and divan, massive ceiling beams, carved and twisted stair posts and balusters, columns and archway. The library is treated in Colonial finish, ivory white, with a paneled wainscoting, divans and bookcases built in, and it also has a heavy cornice, with ceiling beams. The fireplace is built of brick, with tiled hearth and facings, and a richly carved mantel of Colonial style. The living-room is finished in North Carolina pine, stained and finished a dark sea green. It contains a paneled wainscot, ceiling beams, paneled seat, and an open fireplace, with a richly carved mantel. The billiard-room is trimmed with North Carolina pine, and stained and finished a deep red color. It has wainscotings, seats, cornice and ceiling beams, and an open fireplace, with brick hearth and facings, and a richly carved mantel of the English style. The dining-room is finished in mahogany and ivory white, with a most excellent effect. It contains a paneled dado, beams and cornice, a richly carved buffet built in, and a fireplace similar to the ones already described. The windows of these apartments run down to floor and open out upon piazza. The floors are of quartered oak and highly polished. The butler's pantry, kitchen, servants' dining-room, and other connecting apartments are trimmed and wainscoted with North Carolina pine, with hard pine floors. These apartments are furnished with all the best modern conveniences. The second and third floors are trimmed with white pine, and have hard pine floors. The second floor contains six bedrooms, three bathrooms, child's room and bath, and four servants' bedrooms and bath, with private stairway to kitchen and third floor. The bathrooms are wainscoted and furnished complete with exposed plumbing. The third floor contains numerous bedrooms, baths, and storage-rooms. Cemented cellar contains laundry, furnace, and other necessary apartments. Messrs. Winslow & Wetherell, architects, Philips Building, No. 3 Hamilton Place, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

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THE FRONT OF THE RATHHAUS IN WESEL.

The Rathhaus in Wesel, with its picturesque old front, is one of the most beautiful monuments of Rhenish profane architecture that has been preserved from that period, the fourteenth century, so remarkable for artistic development. It was built by a certain Gelisz, between the years 1390 and 1396, the former Rathhaus having been destroyed when that portion of the city in which it stood was burned in 1354. While the interior of the building has been altered in accordance with the varying needs of the times, the main front, facing the Great Market Place, has been quite well preserved, and it and the recently restored Willibrordikirche are ornaments to the city, as well as valuable historical relics. The breaking up of the wall surface throughout its entire width is especially characteristic of the front, the numerous windows being arranged in rows, so that the narrow strips of wall between them have the effect of pilasters. The stories are divided by three mouldings of equal size, but on the top of one of these mouldings there is a stone parapet, the surface of which is broken by post-like ornamentations that are continued above the top line of the stone wall in the form of pinnacles. The parapet is crowned with decorative stonework. The high, sloping roof is partly hidden by the parapet, but still constitutes a striking feature of the building when seen from a distance. This arrangement was quite common in Gothic times for buildings that were provided with pinnacles or gables. The arrangement of single, double, and triple windows is particularly effective, but, unfortunately, many of the leaf and flower decorations above the windows have been so affected by the weather that it has been necessary to renew them, and the new work is a very poor copy of the beautiful old forms. Between the windows on the main floor there are seven statues, under baldachins. Originally, these represented the Virgin, the Three Wise Men of the East, and St. Anthony, St. Christopher and St. Willibrord, the face of the latter being turned toward the neighboring church, which was dedicated to him; but these figures also succumbed to the fatal work of the weather, and, some decades ago, were replaced by statues of modern princes, which look strangely enough under the Gothic baldachins. The treatment of that portion of the front which contains the main entrance is specially artistic; it is provided with triple windows, richly decorated, and is topped by an octagonal tower, containing the bell that formerly called the city "Rath" together. This tower was clumsily altered during one of the "renovations." In the accompanying engraving, an effort has been made to restore some of the original features of the building. The building runs through the entire square, and the rear façade, on the Fish Market, stands parallel to the front, which it must have resembled when the building was new; but in the latter part of the last century, all of its architectural parts were removed, and it was covered with stucco in the crudest manner. At the same time, the old leaded windows of both façades were replaced by the ordinary wooden window sashes that now disfigure the building. The chronicler of that time was very proud of this work, and wrote, not without conscious pride: "In the years 1783 and 1784 the Rathhaus was made to look almost new; it was repaired throughout, and newly painted with oil paint." The same historian also tells of the changes made in the interior of the building at that time, and says, in speaking of the decoration of the rooms: "Both . . . are beautifully decorated. In the centre of the ceiling of the large hall is a fine piece of plasterwork, representing the coat-of-arms of the Duchy of Cleves and the city of Wesel, and in one corner —instead of the former ordinary fireplace—is a beautiful niche, above which is a representation of Justice, in fine plasterwork." It is evident that the hearts of the people of that time were captivated by the "fine plasterwork." Although the front of the building is divided uniformly by mouldings, the nature of the exterior architecture indicates plainly the real heights of the stories, which vary according to the purposes for which they were originally intended. The first or main floor contains, besides the large *Vorhall*, the Court room, several anterooms, and, on the Fish Market side, the great *Rathssaal*. In the upper stories were the government and other business offices, while the high basement formed a large salesroom, running the entire length of the building, to which there were entrances on both the Great Market and the Fish Market. As has been already stated, a complete reconstruction of the interior became necessary to meet the requirements of the times. The chamber in which the City Corporation now holds its sessions is in the upper story, where, judging from the exterior of the old building, one would least expect to find it; and the main floor, as well as the great hall in the basement, has been arranged for offices. On account of the great increase, during the last ten years, in the number of employés required by the City Government, an addition to the present structure will be necessary, sooner or later. May the city then give the old building proper care and attention, so that it may be preserved unharmed, as an honored relic of the old Vesalia for centuries to come!—*Zeitschrift für Bauwesen.*

THE FRONT OF THE RATHHAUS IN WESEL.

A MODERN COTTAGE AT RICHMOND HILL, N. Y.

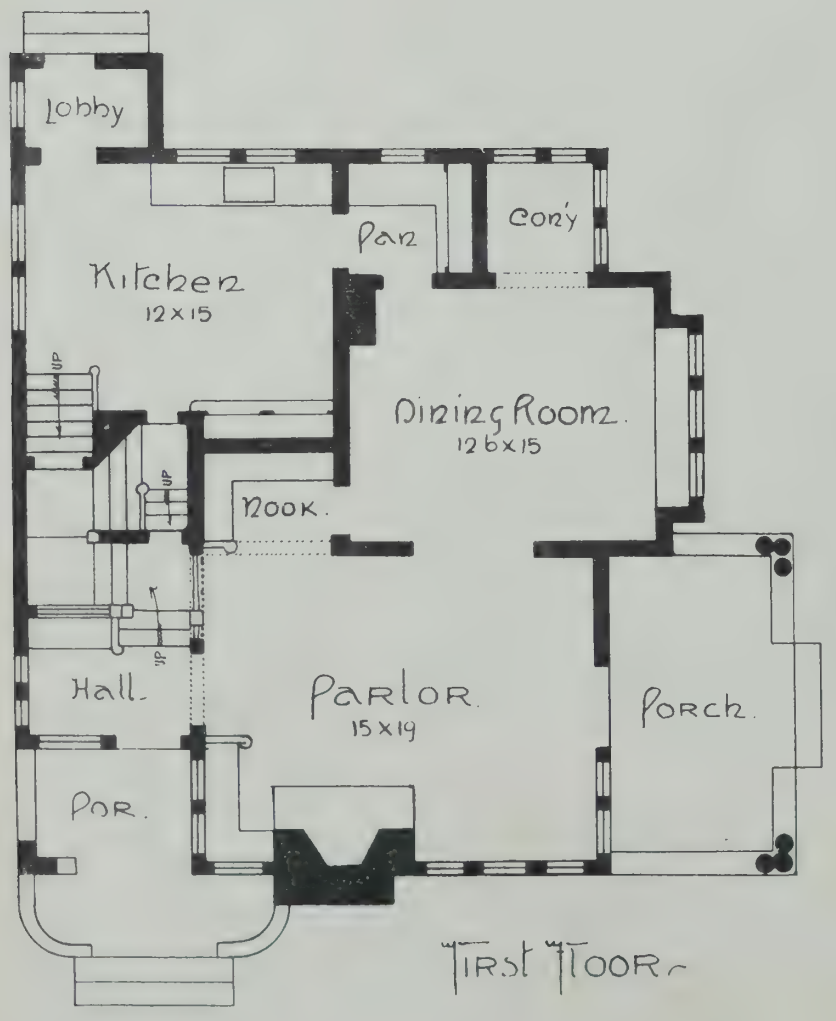
We present herewith, on page 97, in this issue, a cottage of modern treatment, which has been recently completed for Messrs. Haugaard Bros., at Richmond Hill, Long Island. The elevations have many excellent features, and the plans are well arranged. The underpinning is built of local rock-faced stone. The first story is covered with clapboards on the exterior, and painted olive yellow, with ivory white trimmings. The second and third stories are covered with shingles of cedar, and left to finish natural. The roof is shingled, and finished natural. The blinds are painted bottle green. Dimensions: Front, 31 ft.; side, 35 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft; second, 8 ft. 6 in.; third, 8 ft. The first floor is trimmed with oak. The hall contains an ornamental staircase, with turned newel posts, balusters, and rail. A window, glazed with stained glass, on first landing, sheds a soft and pleasant light over both halls. The parlor contains a false fireplace, with tile facings, and a mantel of good design, with columns and mirror. The dining-room has an open fireplace, with hearth and facings of tiles, and a mantel of oak. The floors of these apartments are of oak. Kitchen and pantries are trimmed and wainscoted with narrow beaded stuff, and they are furnished with the best modern fixtures. The second floor is trimmed with whitewood, finished natural, and it contains three bedrooms, large closets, and bathroom, the latter wainscoted, and furnished with porcelain fixtures and exposed plumbing. Third floor contains two bedrooms and storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Messrs. Haugaard Brothers, architects and builders, Richmond Hill, N. Y.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN DWELLING AT BRIDGEPORT, CONN.

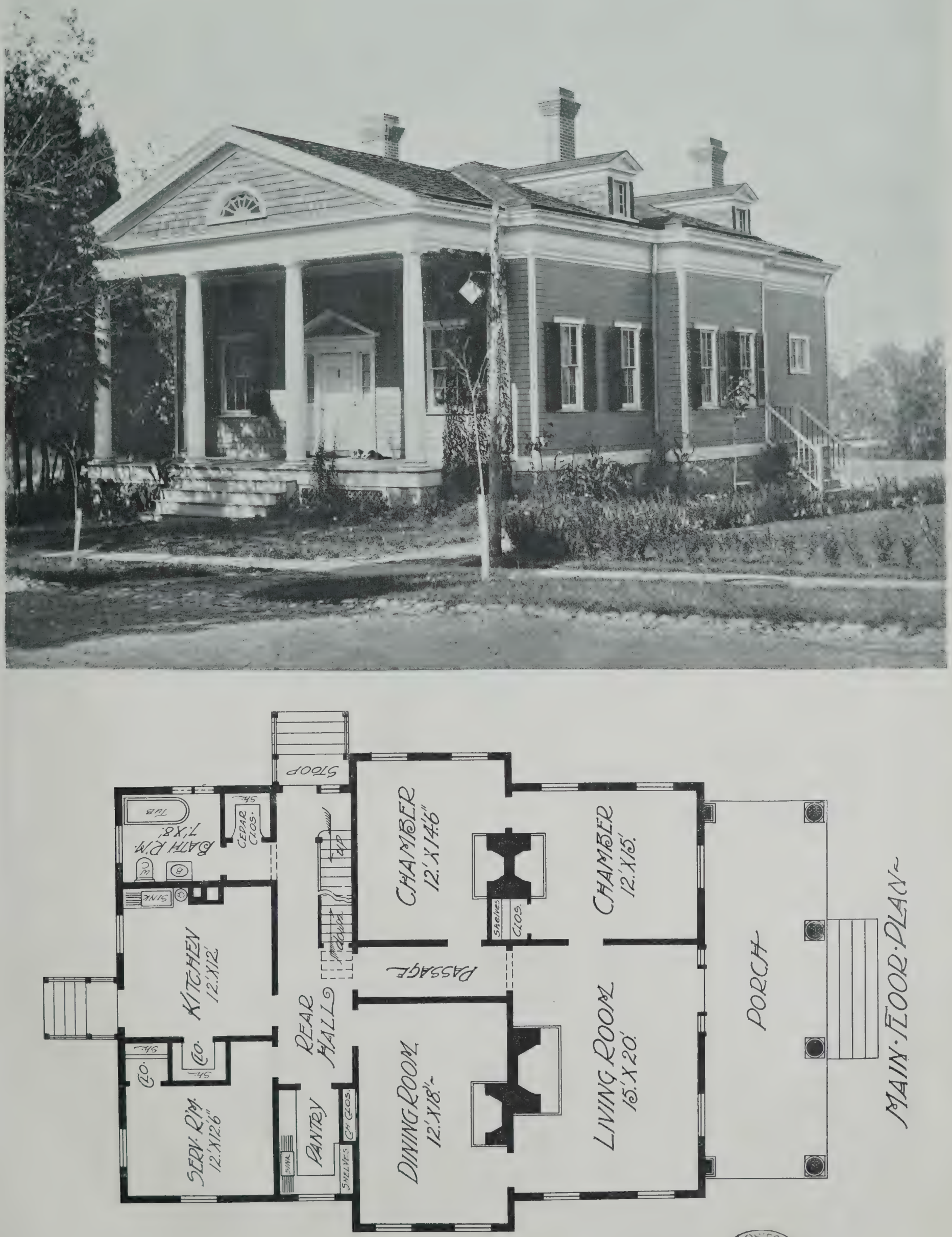
We present herewith, on page 96, in this issue, a modern dwelling which has been erected for Mr. Lamphere, at Bridgeport, Conn. The combination of this dwelling is most unique, owing to the fact that it is composed of pleasing elevations, well arranged plans, and was erected for $1,850 complete. The underpinning is built of rock-faced bluestone, laid up in a neat manner. The exterior framework is covered with sheathing, and then clapboarded and painted a silver gray color, with darker trimmings. The roof is covered with octagonal cut slates. Dimensions: Front, 22 ft.; side, 32 ft, not including porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior is trimmed with whitewood, and is stained and varnished. The hall contains an ornamental staircase, with newel balusters and rail. An archway separates hall from parlor, the former being well lighted with delicate tinted glass windows. Parlor and dining-room each have octagonal projections. The kitchen and pantries are all fitted up with the usual fixtures. There are three bedrooms, large closets, and bathroom on second floor. Bathroom is wainscoted, and fitted up with the best modern fixtures. Third floor contains one room and ample storage. Cemented cellar contains furnace, laundry, with stone set trays, and other necessary apartments. Mr. Harrison G. Lamson, architect, No. 16 P. O. Arcade, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.



A COTTAGE AT NEW HAVEN, CONN.—See page 106.

BOSTON PUBLIC



A COLONIAL HOUSE AT CHEVY CHASE, MD.—See page 106.

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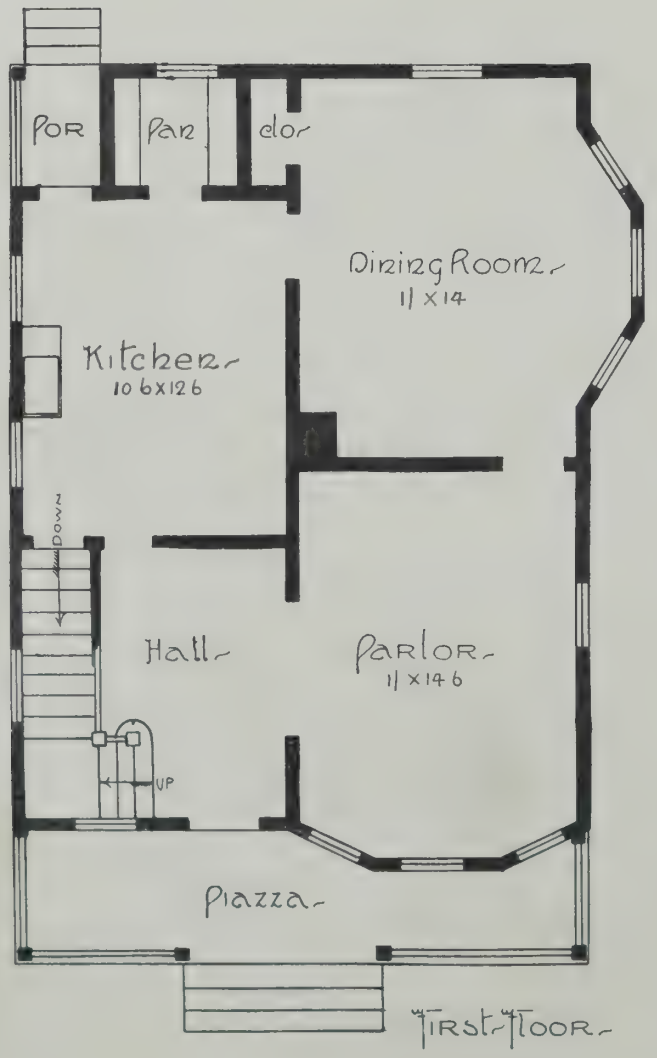

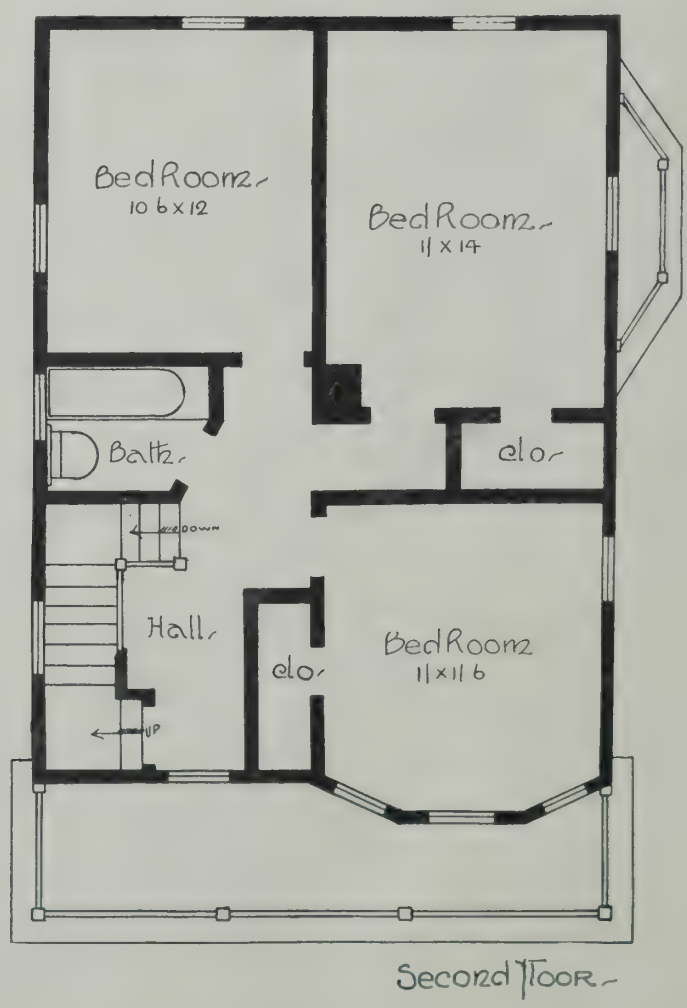

A MODERN DWELLING AT BRIDGEPORT, CONN.—See page 93.

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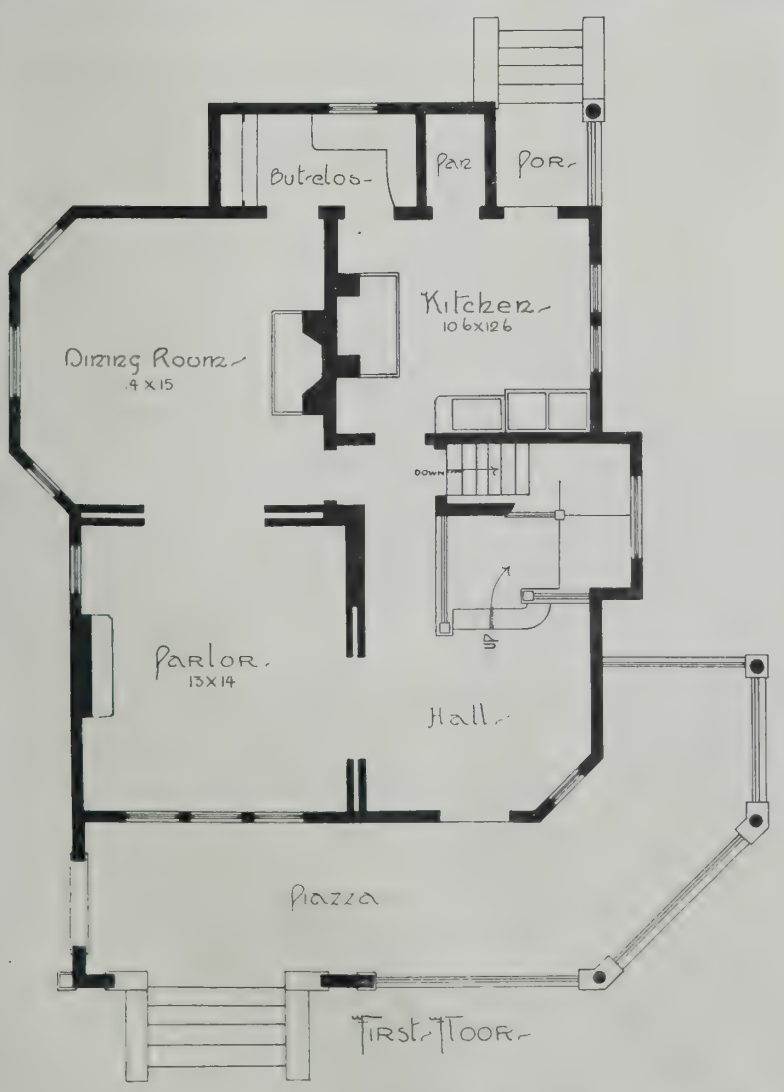
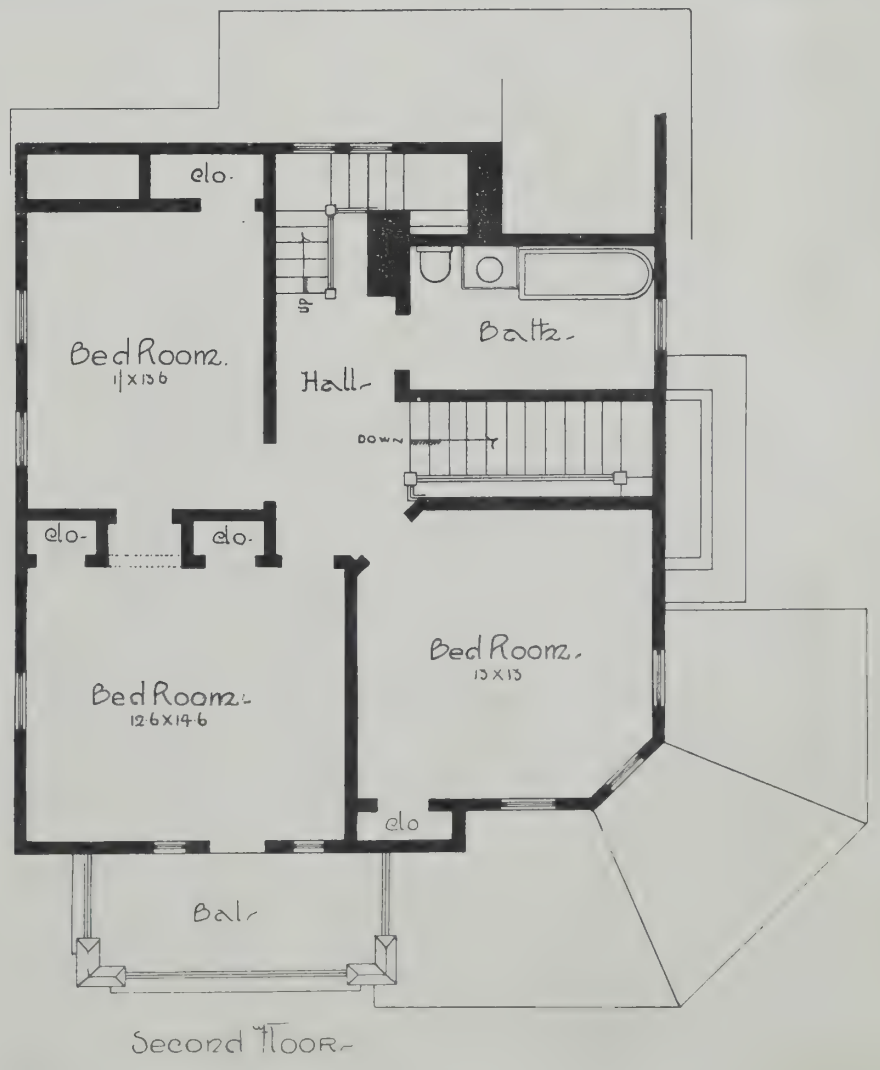
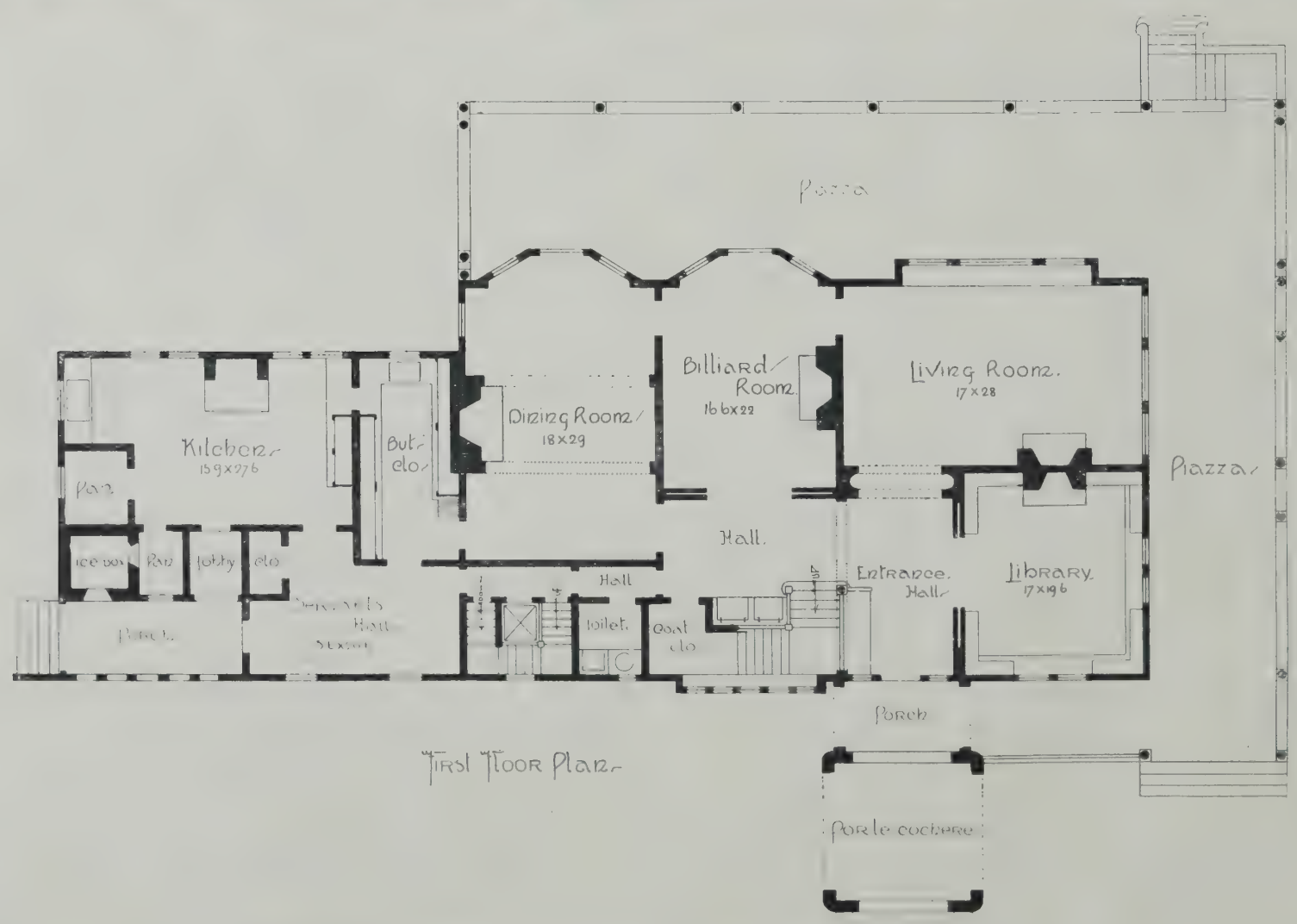




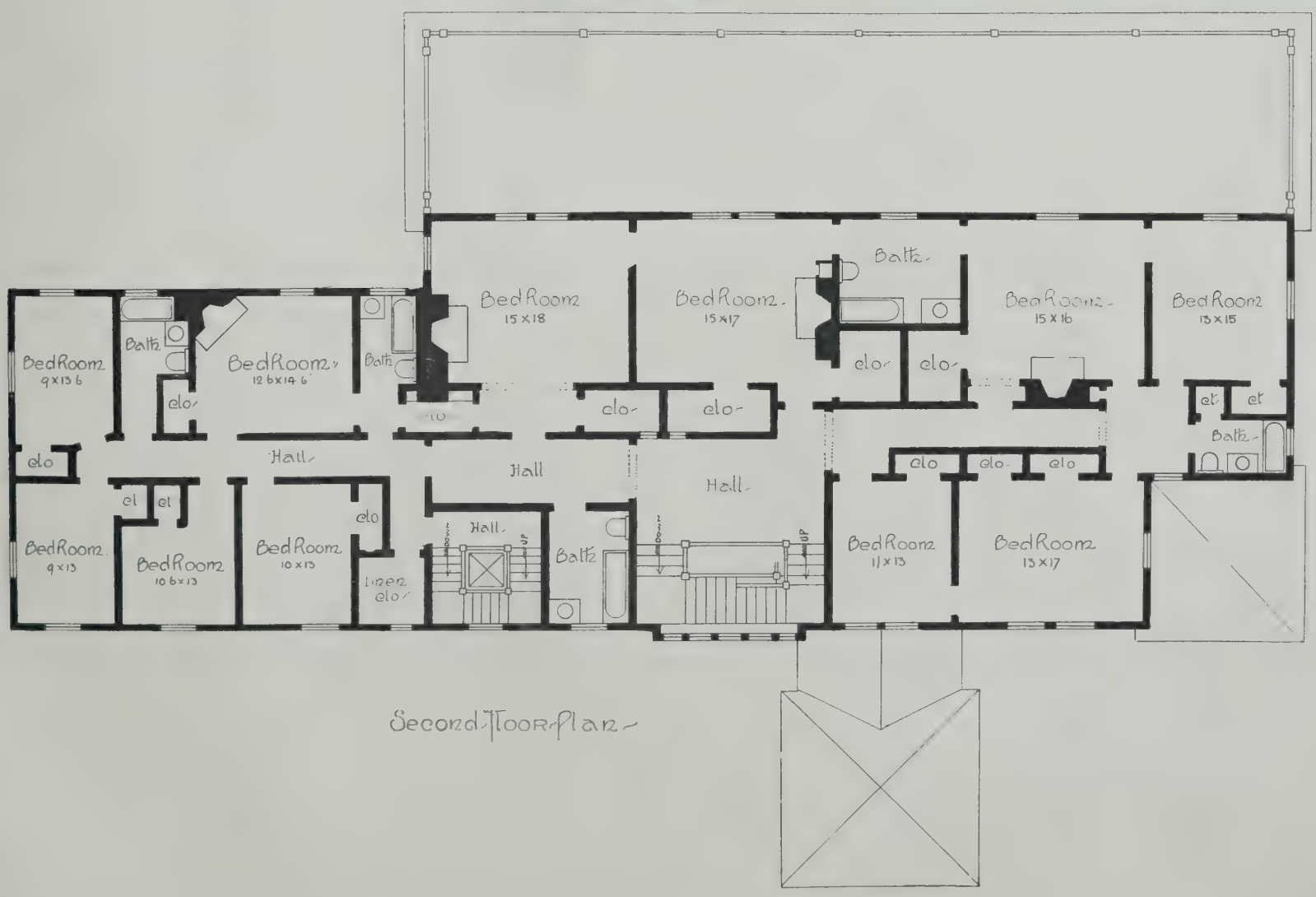
A MODERN COTTAGE AT RICHMOND HILL, N. Y.—See page 93.

BOSTON PUBLIC



A COUNTRY RESIDENCE AT MANCHESTER, MASS.—See page 92.

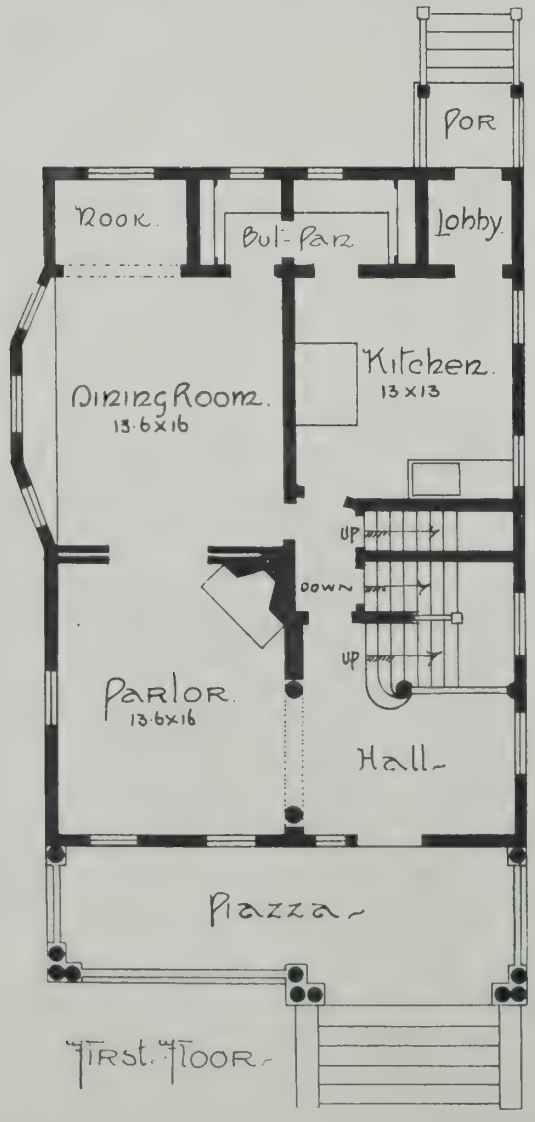
BOSTON PUBLIC

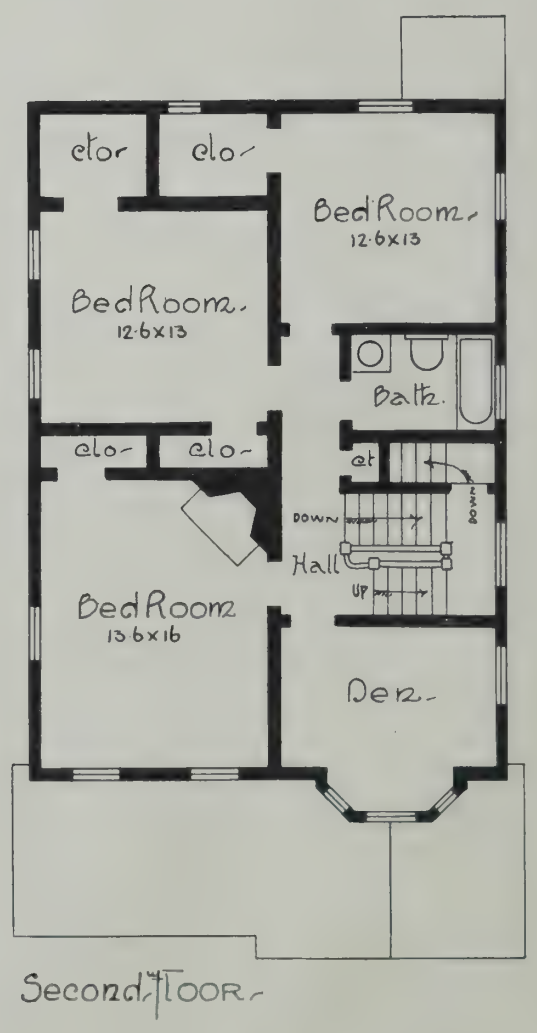


Second Floor Plan.

A COUNTRY RESIDENCE AT MANCHESTER, MASS.—See page 92.

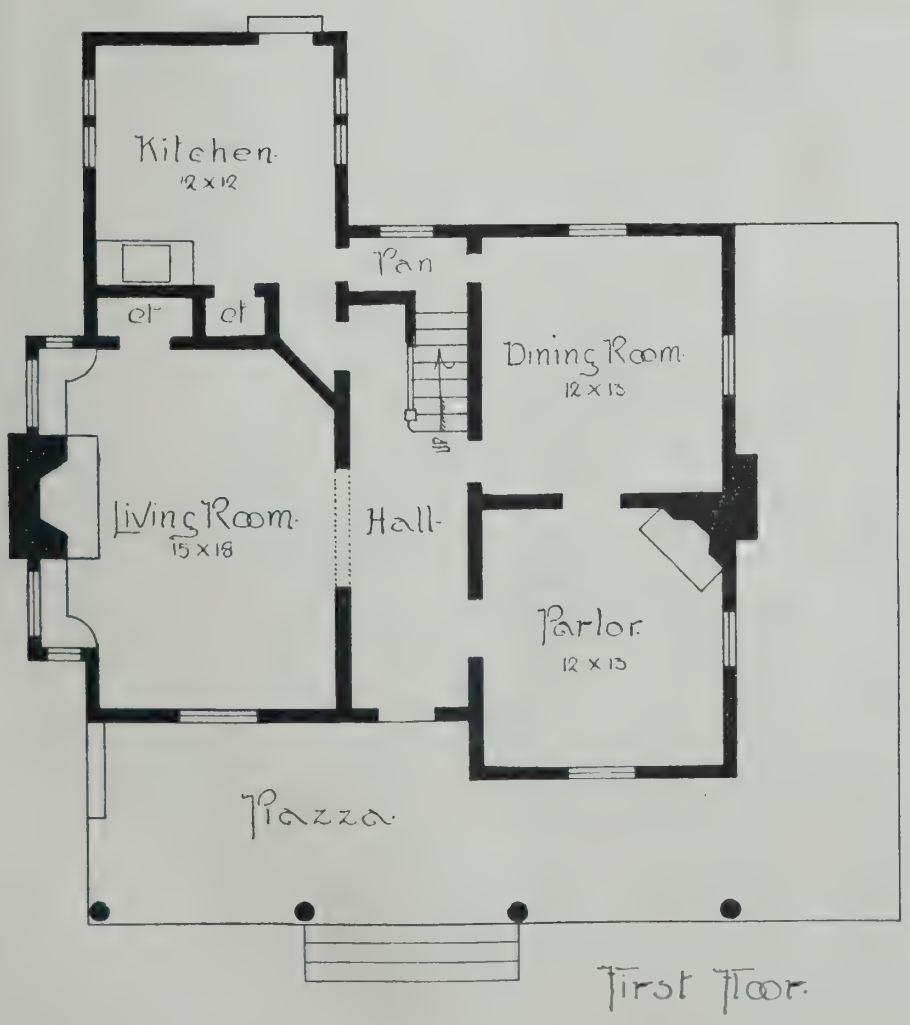
BOSTON PUBLIC

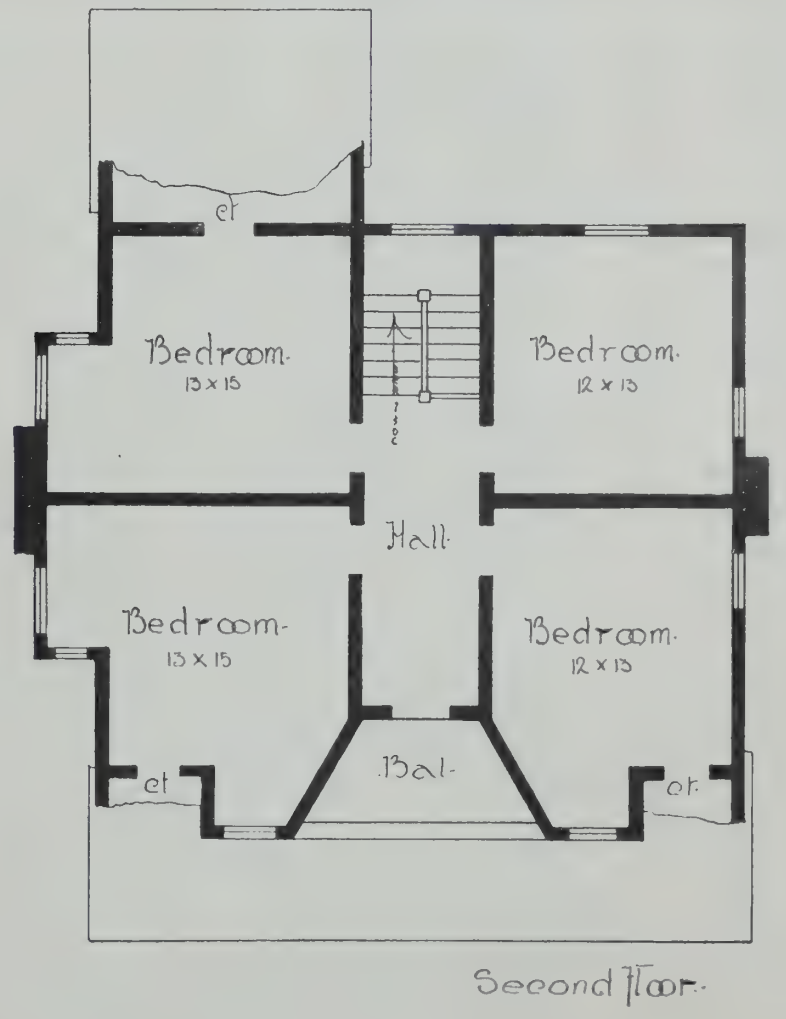




A COTTAGE AT BROOKLINE, MASS.—See page 106.

BOSTON PUBLIC





A SUMMER DWELLING AT CUSHING ISLAND, ME.—See page 106.

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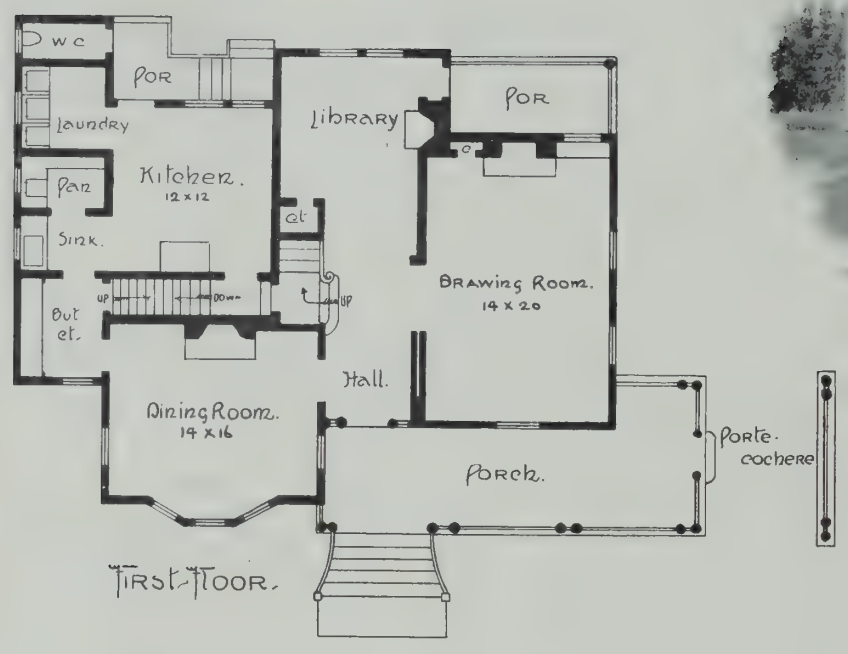
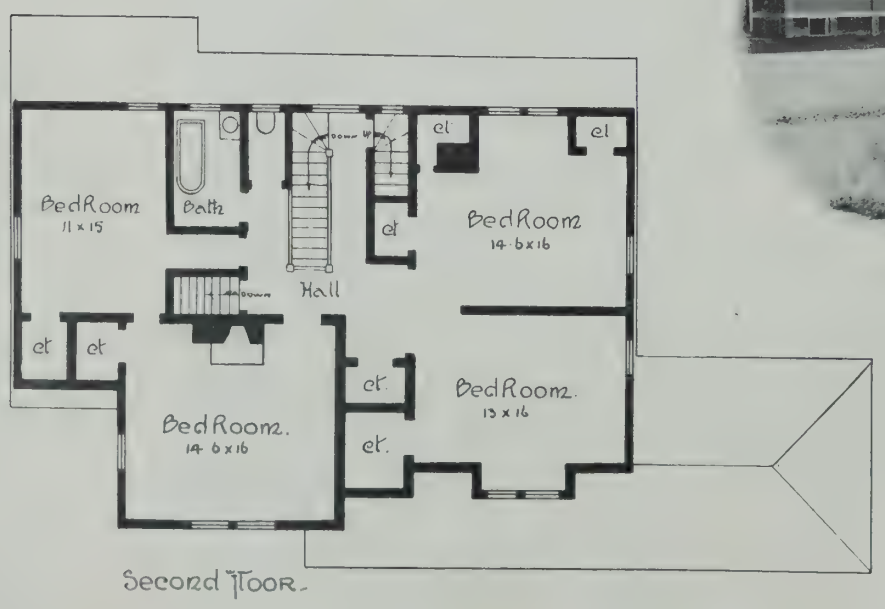
A RESIDENCE AT BINGHAMTON, N. Y.—See page 106.

INTERIOR VIEWS OF NEW YORK STATE CAPITOL.—See page 105.

1. View showing Panel in Over-Mantel in the State Lunacy Commissioner's Room. 2. View showing Ledges with Carvings of Columbus and the Viking Ship, Grand Western Staircase. 3. View showing Carving on Balustrade, Grand Western Staircase. 4. View of Governor's Room.





A COTTAGE AT SOUTH ORANGE, N. J.—See page 105.

NEW YORK STATE CAPITOL BUILDING.

We published in our last issue a perspective view of the State Capitol Building at Albany, N. Y., together with interior views of the Senate Chamber and the grand western staircase, while in this issue we present additional views of the grand western staircase, and also the Governor's room (Fig. 4), on page 103.

The illustration (Fig 2) presents a view of the balustrade in the six openings on third floor. Very careful attention has been given to the forms and decorations of this balustrade. The balusters stand on ledges, which project into the staircase, forming bays (Fig. 2), from which a full view of this great work is obtained. The ledges upon which the balustrade rest are curved and project into the staircase, and bear spirited carving. On the centre ledge on the north side is an excellent carved head of Columbus, in bas-relief, and the three caravels in which he and his crew made their first voyage to America.

Upon the western ledge is carved the Viking ship, and on the east ledge a modern steamship is represented, both in bas-relief. The carved work is cut on disks surrounded by rich foliage. The rails of the three openings, and the stops of the same, on each side, are richly carved, the foliage of the rails lapping around the columns, and the whole producing a very rich and interesting study. On the south and corresponding ledge of the centre opening is carved the head and neck of a typical American girl, the arms of which are concealed by the foliage, while projecting through the same and in sight are the hands. On the west ledge is a plowing scene, and on the east ledge a log schoolhouse set in a clearing, the scene representing a forest of timber, and children on their way to school.

The entrance to the State Library is from the western corridor of this floor. Much care has been given to the designs, and on the transom over the entrance is a carving representing the head and neck of Minerva, with a wreath of oak leaves falling down on either side. The entrance is flanked on either side by columns with carved caps. The carved head of Homer is recessed between the columns on one side of the doorway, and that of Shakespeare on the other.

The balustrades of the stairs are one of the leading features; they are varied in design, and a portion of them have richly carved consoles at the top, and carved stops at the foot. These balustrades extend from pedestal to pedestal, from first to fourth story. The treatment of the work has been very carefully considered in design, and the workmanship is most excellent and effective, producing a beautiful and harmonious effect when viewed in detail or as a whole.

The string courses and pedestals are cut in single stones. The balusters are cylindrical in form, and have moulded bases and carved caps, the latter differing one from the other.

The rails (Fig. 3) are treated with flowing foliage at either end, and representing some very fine carving, so fine in its detail and execution that it resembles lace-work.

Between the capitals of the piers on each side of the centre section of steps to the second story, which consist of a variety of flowing foliage, are historical heads. On the inside of the right-hand pier, looking from the western lobby, is represented the carved head of General George Washington, and, opposite, that of Thomas Jefferson, and on the side facing the lobby are the heads of Generals Scott and Taylor. On the inside of the same piers, in view when descending the steps, is the head of Americus Vespucius, and also that of J. Fenimore Cooper. On the inside of the right-hand pier, looking across the steps, are the carved heads of Franklin and De Witt Clinton, and flanking the same on the right and left are the heads of Henry Hudson and Champlain.

On the inside of the piers, when descending the steps, are the carved heads of John Jay and Silas Wright.

A portion of the models, or the heads of distinguished men, represented in the clustered columns on the third story, are those of the late President Lincoln, William H. Seward, Alexander Hamilton, George William Curtiss, the scientist Joseph Henry, and Robert Fulton. These columns are varied in design, with disks in the centre of the four sides of each, surrounded by foliage. The name of each county of the State is lettered on the central disks, there being sixty in all.

Several competent judges have made favorable mention of the heads, and it is hoped and believed that they are creditable to the memory of the various distinguished persons they represent.

When this work is fully completed, a wealth of richness in decorative architecture will be produced seldom executed in stone, owing to the fact that, in preparing the decorative scheme, it has been Mr. Perry's idea to produce a variety in ornamentation.

When the carving is completed, there will be at least 17,000 superficial feet of decoration on the stairs, and notwithstanding this enormous amount of surface, in viewing the stairs as a whole, the indication is that the carving has been sparingly dealt with. To give a more comprehensive idea of the magnitude of this work, it has required 136,000 cubic feet of stone to construct it.

We present a panel (Fig. 1) in over-mantel in the State Lunacy Commissioner's room.

There is no mistake but what this great work is worthy of the State of New York, and this idea has been strengthened by many of the most eminent architects of this and other countries, and, if one will look carefully into the character and quality of the work herein described, he will be convinced that the State, by its liberal expenditure of money, has erected a structure which has created a feeling of deep interest in all who have taken the trouble to examine it in detail or as a whole.

The engravings were made direct from photographs taken specially for the SCIENTIFIC AMERICAN.

(Concluded.)

A COTTAGE AT SOUTH ORANGE, NEW JERSEY.

We illustrate herewith on page 104 and below a unique design for a suburban dwelling which has been erected for W. L. Coulter, Esq., at South Orange, New Jersey. The design is of good proportions, with its lines well broken, and it has a spacious piazza and porte-cochère. The underpinning is built of brick, while the superstructure is constructed of wood. The first story is covered on the exterior with clapboards and painted a warm gray color, while the second and third stories are covered with shingles and painted a reddish brown color.

HALL AND LIBRARY OF A COTTAGE AT SOUTH ORANGE, NEW JERSEY.

The trimmings are cream-white. The roof is also shingled. Dimensions: Front, 44 ft. 6 in.; side, 36 ft., exclusive of piazza and porte-cochère. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft 6 in.; third, 8 ft. The hall, running through the centre, with stairs at side, forms ample space for library at the rear end. This hall is treated in old ivory white, and it harmonizes nicely with the deep, rich red wall paper which covers the walls above. The staircase is an ornamental one, with the newel formed of a cluster of balusters. The treads are of cherry, the newels, risers and balusters of white, and the rail of mahogany. The doors are stained and finished in mahogany. The end of hall, used as library, is provided with an open fireplace, built of blue Dutch tile, with facings and hearth of same. The parlor is tinted in old ivory white, with old yellow walls, and a fireplace trimmed with old yellow tiles and a mantel of exquisite design. The dining-room is stained mahogany, and the walls are tinted olive green. It contains an open fireplace built of Roman brick, with hearth and facings of same. Kitchen, laundry, and pantries are wainscoted and trimmed with whitewood and finished natural, and they are furnished with all the necessary fixtures. The second floor contains four bedrooms and bathroom, the latter wainscoted and furnished with J. L. Mott's fixtures, all nickelplated, and the trim is treated in ivory white. The other apartments are treated in delicate colors. Two rooms and storage on third floor. The

windows are glazed with plate gla s. The floors are laid with cone-grained yellow pine. Cemented cellar contains furnace and other necessary apartments. Cost, $5,800, complete. Mr. W. L. Coulter, architect, 367 Fifth avenue, New York.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A RESIDENCE AT BINGHAMTON, N. Y.

We present herewith in this issue, on page 102, a residence erected for Robert Rose, Esq., at Binghamton, N. Y. The engravings present a design of unusual beauty, with many excellent features and interesting bits of detail, all of which add much to the building, with its finely executed lines. The building is constructed of the best materials in a thorough workmanlike manner. The underpinning is built of ashlar rock-faced red sandstone. The superstructure is built of buff brick of a light shade in color, while the trimmings are of red sandstone. The gables are paneled, and the spaces are filled in with stucco-work. The roof is covered with red corrugated tiles. Dimensions: Front, 50 ft.; side, 58 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 9 ft. The vestibule has a tiled mosaic floor, and a paneled wall and ceiling. The hall and reception-room are trimmed with quartered oak, and are wainscoted in panels. The ceiling is beamed. The colonnaded effects are supported upon columns with carved capitals. The staircase is handsomely carved, and is provided with newels, posts, balusters, and rail. A bay window is thrown out at first landing, and it has a cluster of stained-glass windows, which shed a soft light over this staircase and both halls. The reception-room is provided with a cozy nook and seat, and an open fireplace, trimmed with tiled hearth and facings, and a massive mantel, with columns extending to the ceiling. The drawing-room is trimmed with satinwood, and handsomely carved. It has a paneled wainscoting, two feet in height, running around the entire room. At the end of room there are two stained-glass windows, between which is a mirror rising from floor to ceiling, and filling in the whole space between windows. The library is trimmed with cherry, and it has a paneled wainscoting and divan, and bookcases built in, and also a fireplace, trimmed with tiles and wrought iron fixtures, and a carved mantel. Dining-room trimmed with cherry, and it has a paneled wainscoting and beamed ceiling. The buffet, which is built in nook, is elegantly carved, and rises from floor to ceiling. Kitchen and its apartments are trimmed and wainscoted with whitewood, furnished with all the best modern conveniences. The rear hall and staircase, with entrance to porte-cochère, is a convenience. The second floor is trimmed with whitewood, and treated in colors. It contains five bedrooms, two bathrooms, large closets, and one dressing-room. The bathrooms are paved and wainscoted with white enameled tiles, and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains billiard-room, two bedrooms, and two trunk-rooms. The billiard-room is fitted up in a handsome manner. Cemented cellar contains furnace, laundry, and other necessary apartments. Mr. F. E. Webb, architect, No. 188 Oak Street, Binghamton, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A COTTAGE AT NEW HAVEN, CONN.

We present, as the subject for colors, and as an illustration on pages 91 and 94 in this issue, a cottage which has been erected for Samuel York, Esq., at New Haven, Conn. The design is of the modern Queen Anne treatment, very pleasing and attractive in its appearance, with many admirable features, and it is combined with a most excellent plan, with an interior handsomely treated and finished. The chimney at front, part of first story, and underpinning are built of field stone, laid up at random, with the moss still clinging to the stones as they were gathered from the woods. The remainder of the first story and the second story is constructed of wood, with the exterior covered with shingles of cedar, and stained a dull brownish color, while the trimmings are painted a reddish brown. The roof is shingled similar, and is stained a moss green. The chimney at front is topped out with red brick, laid up in red mortar. Dimensions: Front, 32 ft.; side, 33 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. An excellent feature of the plan is the entrance porch at front and the family piazza at side, which adds much privacy to the latter, it being separated from the former. The reception hall, parlor, and dining-room are trimmed with brown ash, and each has hardwood floor. The reception hall and parlor are separated by an archway, with the newel post at stairs rising to ceiling and supporting arch; both have ceilings beamed, and the spaces between beams are paneled. The staircase is a combination one, of handsome design, with a paneled divan at side. The parlor has a pleasant nook, with seat, and a paneled divan built in at the right of fireplace. This fireplace is built in the rustic style of field stone, laid up at random, same as the other stonework herein mentioned. The dining-room has a bay window at side, with a cluster of latticed windows, and a conservatory at side, with the usual necessary fixtures. The kitchen and pantries are trimmed and wainscoted with North Carolina pine, and are furnished with the best modern conveniences. The second floor is trimmed with whitewood left in its natural state, and finished with hard oil. This floor contains four bedrooms and bathroom, besides ample closet room. Each bedroom has a bay window thrown out, with paneled seat. The bathroom is wainscoted and furnished replete, with porcelain fixtures and exposed nickelplated plumbing. The third floor contains three bedrooms and ample storage. Cemented cellar contains laundry, furnace, and other necessary apartments. Cost, $5,000, complete. Messrs. Brown & Von Beren, architects, No. 70 Church Street, New Haven, Conn.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A COLONIAL HOUSE AT CHEVY CHASE, MD.

Our illustration and floor plan, on page 95, represent a one story Colonial house at Chevy Chase, Md., just across the district line from Washington, the residence of Mr. Morris Hacker, C.E. The design is simply yet effectively treated in the old Southern Colonial style. Four massive Tuscan columns of good detail, on wide, well shaded (10 ft.) porch, run to cornice belt band above and support the full width pediment, which is relieved by the introduction of a fan window. Several pedimented gable windows break the monotony of the low, shingled roof. Underpinning is of local stone. The exterior framework above is sheathed, papered, clapboarded and painted light yellow; gables, dormers, and roofs, shingled and stained brown; trimming color, white; dark green blinds. Dimensions: Front, full width, 38 ft. 8 in.; side, 47 ft. 8 in., exclusive of porches. Heights: Cellar, 7 ft. 3 in.; main floor, 10 ft.; attic, 8 ft. This attic has ample space for several rooms and storage accommodations. Paneled door of good design, with divided side lights, makes a pleasing entrance feature, opening directly into living-room, with wide fireplace of red brick, having niche above, and walls finished in sand floated plaster, gray in color. The walls of chambers and dining-room are similarly treated, fireplaces also being red brick, with mantel above. The latter room has a china closet, with glass doors, recessed; pantry, with usual fixtures, to left of rear hall, adjoining servants' apartment. Kitchen has usual fixtures complete. Bathroom, with all plumbing exposed, enameled iron tub, and best fixtures, is in the far corner. Cedar closet contains shelving, etc. Cellar, cemented, contains laundry, servants' bathroom, heating apparatus, fuel, storage, etc. General trim throughout, painted pine. Cost, $4,000, complete. Leon E. Dessez, Esq., architect, No. 1421 F Street, Washington, D. C.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A COTTAGE AT BROOKLINE, MASS.

We present herewith in this issue, on page 100, a cottage, recently completed for Mr. D. H. McKay, at Brookline, Mass. The design is very striking and pleasing in its style of treatment, and the elevations have many good features, while the plan is excellent. The underpinning is built of rock-faced stone. The exterior framework above is covered with shingles, and stained a dark brown color, while the trimmings are painted white. The roof is shingled also and stained. Dimensions: Front, 28 ft.; side, 40 ft., not including piazza and bay window. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The hall is treated with china white, and it contains an ornamental staircase with spindle balusters and steps, treated in a similar manner, and a rail of cherry. The newel post is massive, and extends to ceiling, supporting arch. This staircase is lighted effectively by a broad stained glass window. The parlor is separated from hall by an archway with columns. It is treated in china white, and contains an open fireplace, with tiled hearth and facings, and a mantel of Colonial design. The dining-room is trimmed with oak, and it has a paneled wainscoting and a pleasant nook. The floors of these apartments are of oak and highly polished. Kitchen and its apartments are wainscoted and trimmed with whitewood, and are furnished with the best modern fixtures. The second floor is treated in china white, and it contains three bedrooms, large closets, den, and bathroom, the latter wainscoted and provided with the usual porcelain fixtures and exposed nickelplated plumbing. There are two bedrooms and ample storage on third floor. Cemented cellar contains furnace, laundry, and other necessary apartments.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A SUMMER DWELLING AT CUSHING ISLAND, ME.

We present herewith, on page 101, a summer dwelling recently erected for M. S. Gibson, Esq., at Cushing Island, Me. The design is a combination of good elevations and well arranged plans. The building is erected on cedar posts, and the exterior framework is sheathed, and then covered with shingles, and painted chrome yellow. The roof is also shingled, and painted a moss green. Dimensions: Front, 36 ft.; side, 37 ft., not including piazza. Height of ceilings: First story, 9 ft.; second, 8 ft. The interior is trimmed with whitewood, and finished natural. The walls and ceilings are ceiled up with narrow beaded stuff. Hall contains an ornamental staircase. Living-room is provided with window seats, and a large open fireplace, trimmed with tiles, and mantel. Parlor has a similar fireplace. Dining-room is provided with a large pantry. Kitchen is wainscoted, and furnished with the usual fixtures. Second floor contains four bedrooms and large closets. Cost $2,600 complete. Mr. John Calvin Stevens, architect, Portland, Me.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

Stairbuilding.

IN LARGER CITIES NOW A SEPARATE BRANCH OF THE BUILDER'S ART.

Up to fifty years ago carpenters building houses constructed the stairs as well as every other part of the woodwork. Stairs took up a considerable amount of room in a shop, and about that time some carpenters and builders began giving out the stair work to other carpenters, to whom they furnished the lumber. Very soon after that stairbuilders started in business on their own account, with their own capital and material, and ever since then stairbuilding has been in New York a separate business. In some other large cities stairbuilding is now carried on as a separate branch of work. In many other places the stairs are still made by the house builder. Stairbuilding has a literature of its own; there are books that treat upon this subject only.

Stairs, of course, must be built with absolute accuracy, and in a great city, where buildings are put up in great variety and for various purposes, where all the space is utilized, and where so far as possible space is economized, the stairbuilding problems presented are many. In designing a building the architect makes plans of the stairs, drawn to scale; the stairbuilder makes from them the working drawings. Ordinary straight stairs are, when possible, put together in the stairbuilder's shop, and carried bodily to the place where they are to be set up. Fine stairs and all stairs that are bent or curved or reversed, with landings, all stairs that are built otherwise than straight, are set up in the building in which they are to be used. The stairbuilder looks after the support of the stairs as well as the building of the stairs themselves.

While stairs are built from plans and measurements, and, of course, with the utmost care to insure accuracy, yet mistakes are sometimes made, and a mistake in stairbuilding is a serious matter. A defect in stairs cannot be cured; the remedy for it would need to be distributed through the entire structure. When a mistake has been made, there is nothing to do but to throw the stairs away and build anew. As a matter of fact, however, mistakes are rarely made. Many varying sets of stairs are made and never put together until they are finally placed in position in the building for which they were designed, and almost invariably they are made with such accuracy that they come out exactly right.

The height of the stair risers and the width of the treads are determined to a greater or less degree by the situation in which the stairs are to be placed. Some stairs are "easy," and some are not. It is possible to make stairs too easy. There are standard measurements for height of risers and width of tread, and these measurements are used where space permits, as it usually does. People become thus in dwelling places and elsewhere accustomed to stepping certain distances in going up and down stairs, and it might be that making steps to be used under such conditions with lower risers would really make them more fatiguing, rather than less so. Stairs with low risers and broad treads are made for use under certain other conditions, as, for instance, when the stairs are to be used chiefly by old people, and stairs with low risers and broad treads are also sometimes used in front of churches and other buildings of a public character, which people habitually approach with comparative deliberation.—New York *Sun*.

Ivy Makes Dry Walls.

A recent author shows, says the *Industrial World*, that a prevalent notion that the Japan ivy and similar plants which cling to the wall by rootlets make the walls damp is the reverse of the fact. Tons of water are evaporated daily from these leaves in the growing season—an amount which it is almost impossible they could draw from the earth through stems which at the ground are seldom thicker than one's finger. The rootlets suck water from walls to help supply this waste; besides, they cool walls by their shade in summer. The action of the famous English ivy on ruins is referred to as practical proof of the drying character of these rootlets; the mortar is so hard and dry that it is difficult to demolish these walls. If these branches are allowed to get into gutters or other water conduits, so as to choke the flow in heavy rains, it is said the walls may be rendered damp, but not by the mere clinging to the walls of the plants themselves.

ORNAMENTAL GATES AND FENCES.

The accompanying illustrations represent some new and strikingly beautiful designs in gates and fences, made by the Winslow Bros. Company, of Chicago. The work is the result of original study, having for its first object the attainment of harmony with surrounding conditions, this being supplemented by a thorough consideration of the artistic and practical features. The company are manufacturers and designers of all classes of ornamental iron, bronze and brass work, and make a specialty of the Bower-Barff finish and all electroplate finishes.

Abatement of the Smoke Nuisance in Cities.

The following is an extract from a report of the Smoke Commission of the city of St. Louis, Mo., on the Haxtun Steam and Hot Water Heating Boilers:

"Observations were taken from 36 boilers: in 35 of the cases the owners of the boilers were not advised that observations were being taken, and the boilers were being run as they usually are without any special attention. On one boiler a test was made for efficiency as well as smoke prevention. The average per cent. of smoke from all the observations was 2.6 per cent. In summing up the merit of the Haxtun Base Burning Boiler, the Committee reports as follows:

I. The abatement of smoke is accomplished in a very satisfactory degree, without requiring unusual attention or skilled labor.

II. The parts are simple, and not easily put out of repair.

III. The boiler is admirably adapted to heating service, whether when using steam or hot water.

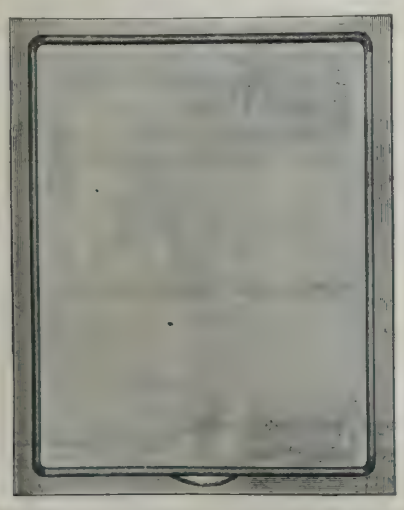
IV. For efficiency, economy, and reliability in heating service, it gives results that are entirely satisfactory, and such as should commend it for general use.

Respectfully submitted,
(Signed) WILLIAM B. POTTER,
WM. H. BRYAN,
CHARLES E. JONES,
Smoke Commission."

These boilers are manufactured by the Kewanee Boiler Company, at Kewanee, Ill., and No. 111 East Lake Street, Chicago.

A NEW WINDOW SCREEN.

The illustration represents a new pattern of window



SUBURBAN PATTERN WINDOW SCREEN.

screen, more particularly designed for suburban houses. It is made by the A. J. Phillips Company, of Fenton Mich. It is removable by pressing to one side, and slides up and down. It can be used at the top or bottom of the window, and has raised oval moulding over edges of wire cloth on back.

ORIGINAL DESIGN OF ORNAMENTAL GATES AND FENCE.

GATE, RESIDENCE OF CHARLES COUNSELMAN, CHICAGO.

GATES, RESIDENCE OF C. J. BLAIR, CHICAGO.

Meta. Roofings, Etc.

The Cortright Metal Roofing Company, with main office and factory at No. 50 North Twenty-third Street, Philadelphia, and Western office at No. 134 Van Buren Street, Chicago, Ill., report a constantly increasing demand for their metal-roofing specialties, *i. e.*, metal slates, Victoria shingles, ridge-coping, hip-covering, valleys, etc. Their standard grade of goods is carefully manufactured of a fine quality of full-weight roofing tin, afterwards painted by a dipping process, which insures a thorough coat on both sides and in all the folds. When desired, they can furnish them galvanized. For galvanizing, they use the tinned sheets, which, although more expensive than the black plates, are far more satisfactory. They also make their goods of copper of any weight that may be desired. Very recently they executed a copper order for metal shingles of over 100 squares for use on a public school building in the Western States.

THE 1897 catalogue of the Foster-Munger Company, manufacturers of doors, blinds, glazed windows, mouldings, etc, is an exceedingly creditable production, giving much valuable information to architects, builders, and others. It has as a frontispiece a picture of Carlton Foster, President of the Company, who has been manufacturing doors and sash at Oshkosh, Wis., since 1864, and was the first white pine manufacturer to ship a carload of sash and doors out of the State of Wisconsin. The factory capacity is 1,200 doors a day, besides complete facilities for making sash, blinds, interior and exterior finish in pine or hardwood in proportion to the door output. The address of the company is 217 West 20th Street, Chicago.

"Benefits of Drainage, and How to Drain" is the title of a valuable pamphlet published by John H. Jackson, of the New York State Drain, Tile and Brick Works, Albany, N. Y. It is some years since the pamphlet was first published, and it has been so widely accepted as authority on the subjects treated that it has had a very large circulation. The author sends the pamphlet free to parties residing in this section of the country who may apply for it.

Shade Trees for the Streets of New York.

We note that the Tree Planting Association has opened offices at Nos. 64 and 66 White Street, New York City. Its aim is to beautify the city by encouraging the planting of shade trees on each side of the streets, and it is endeavoring to start the movement by persuading property holders on Fifth Avenue to plant trees in front of their houses. The aims of the association are in every way praiseworthy, and there is no conceivable way in which the "wilderness of streets" which is found in many parts of the metropolis could be so cheaply beautified and relieved of its monotony as by lining the curb of the sidewalks with suitable shade trees.

THE ALBANY VENETIAN BLINDS.

These blinds, the use of which in making a room attractive may be judged of by our illustration, serve the double purpose of blinds and shades. They are not complicated, can be hung at any window without special preparation of the window, and perfectly control the light entering, keeping out all or any part as desired. They do not interfere with the hanging of sash curtains, draperies, or shades, and, though light, are very durable. They are made by the Albany Venetian Blind Company, of Albany, N. Y., and have attained a wide popularity. Any one can hang them, and they can be taken down in a moment, and as easily replaced. No cornice or front piece needed, as there is nothing to conceal. They are made in all the native woods, and they come all finished, including all necessary hardware, ready to be put up.

THE ALBANY VENETIAN BLINDS.

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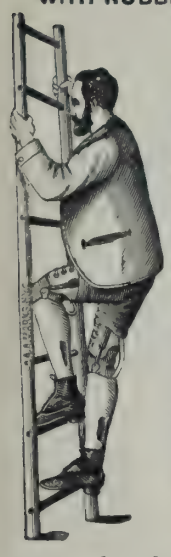

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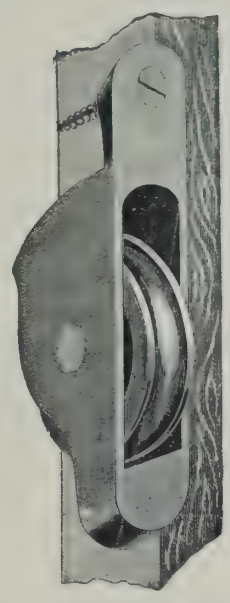

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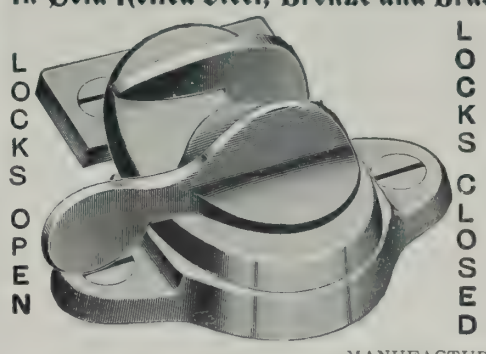

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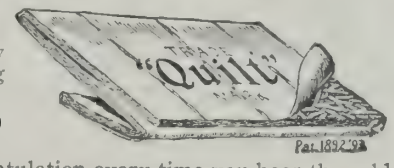

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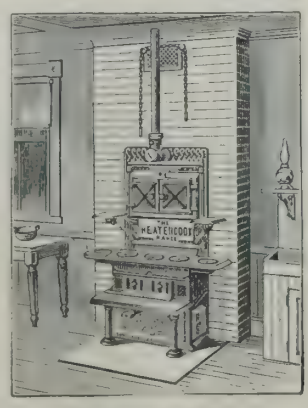

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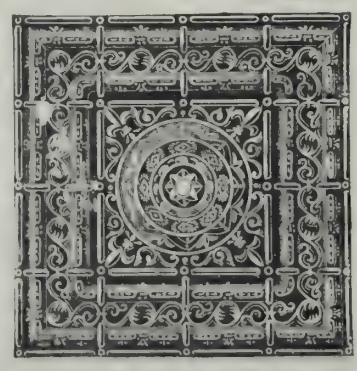

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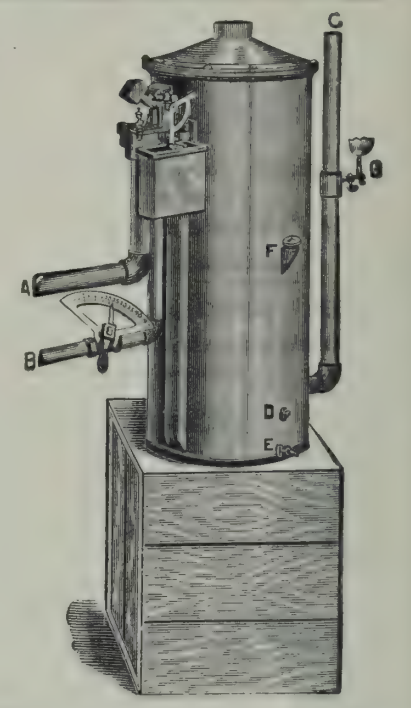

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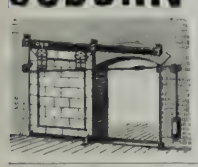

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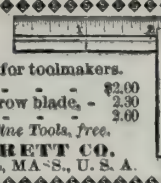

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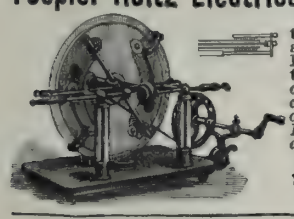

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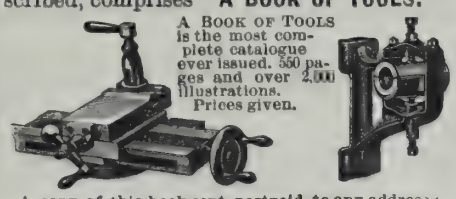

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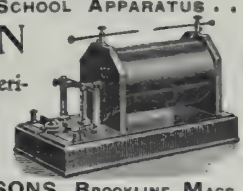

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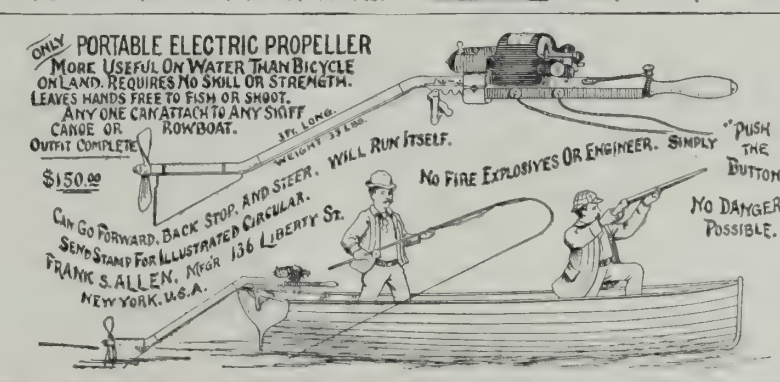

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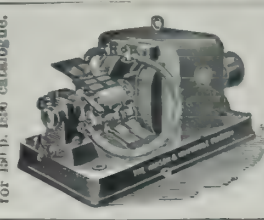

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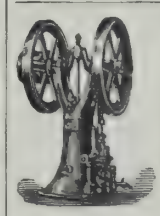

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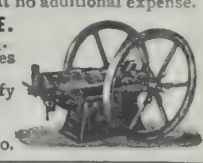

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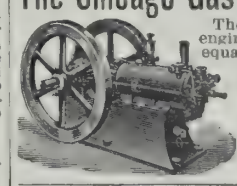

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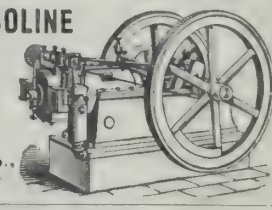

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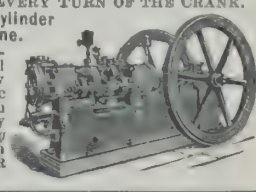

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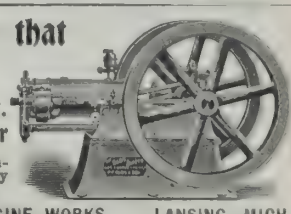

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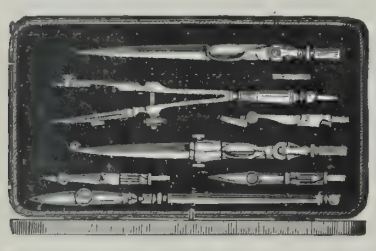

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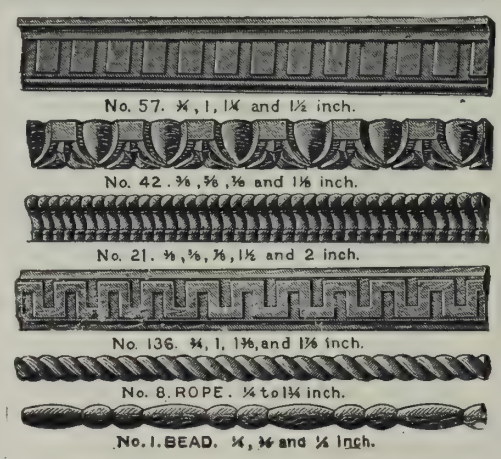

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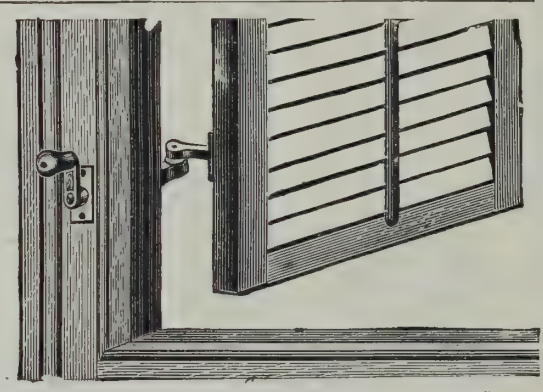

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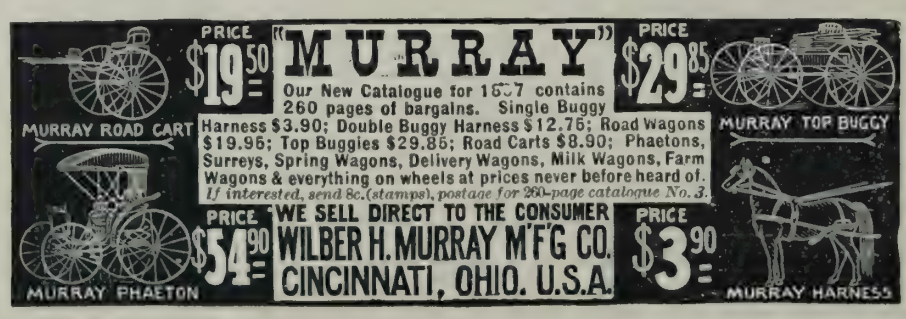

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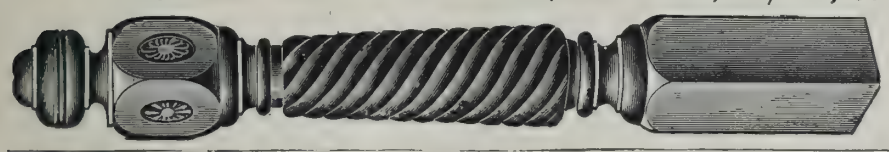

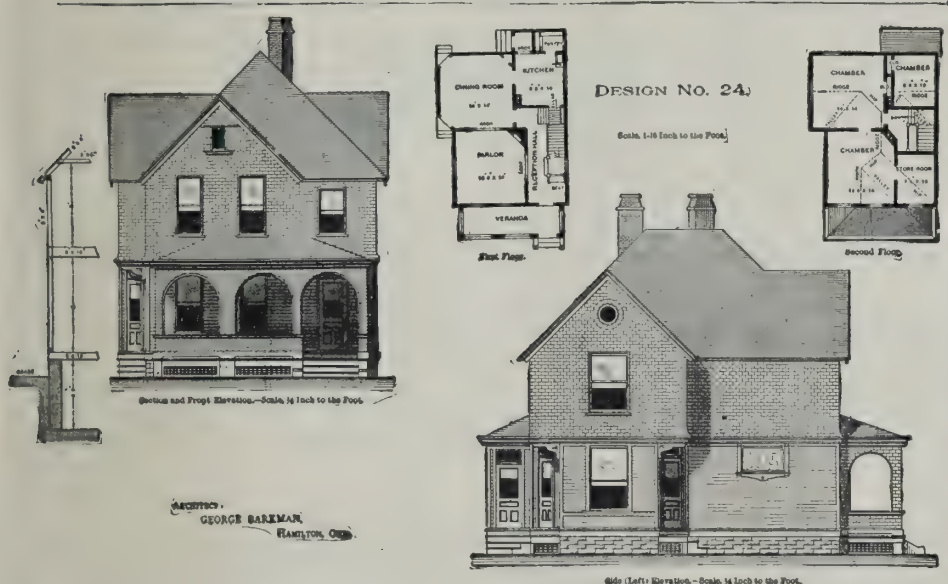

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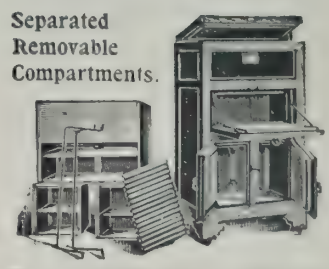

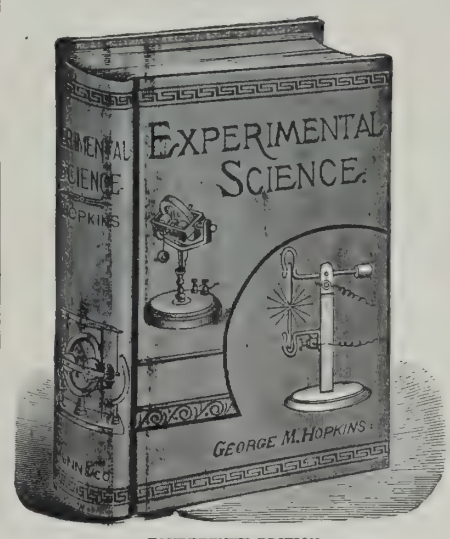

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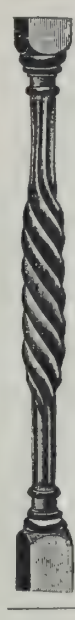

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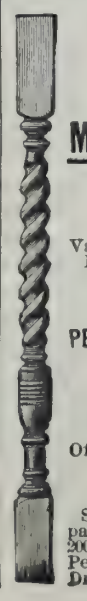

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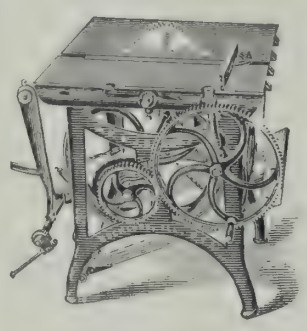

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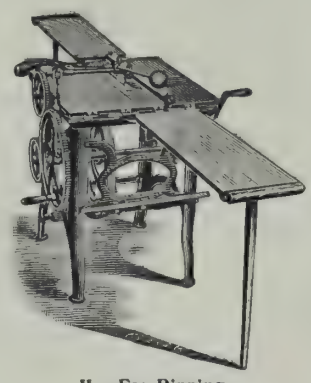

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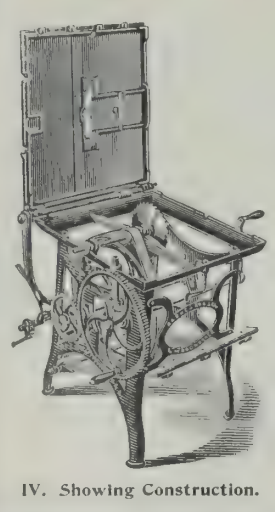

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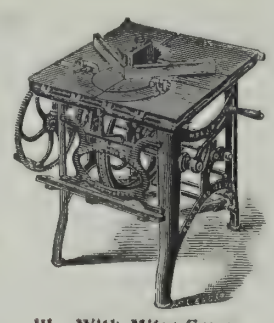

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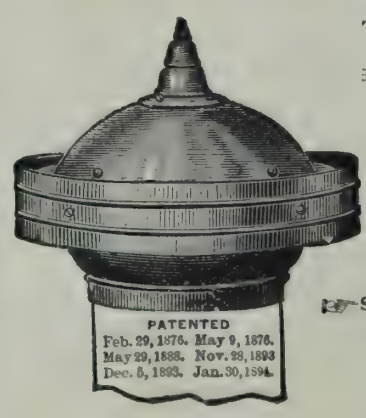

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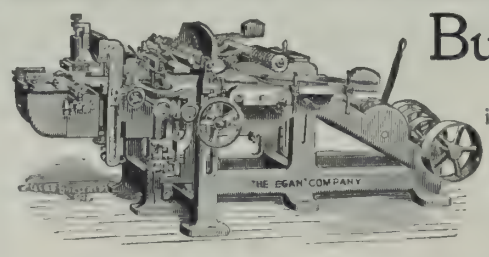

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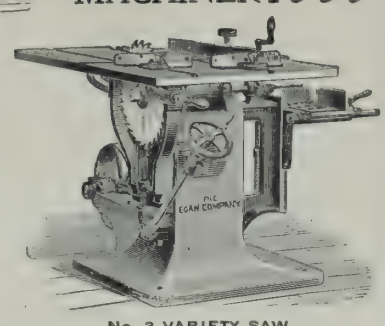

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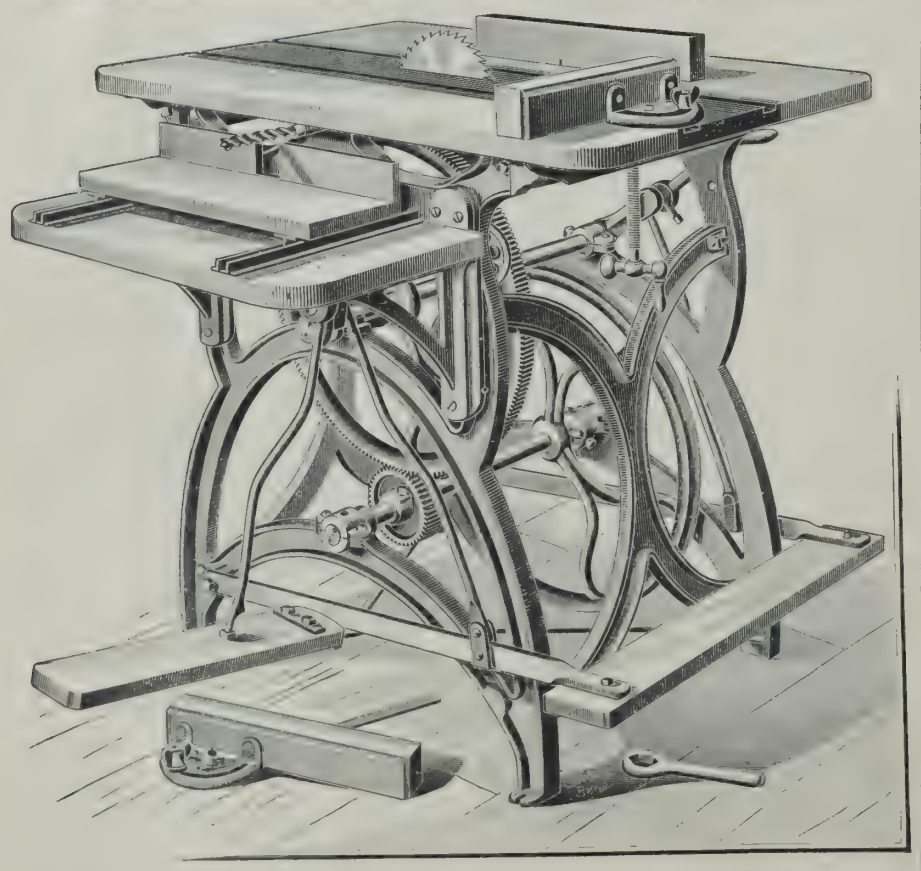

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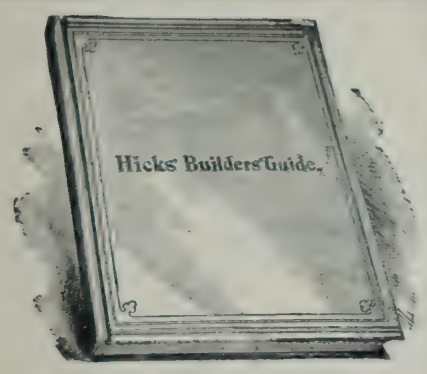

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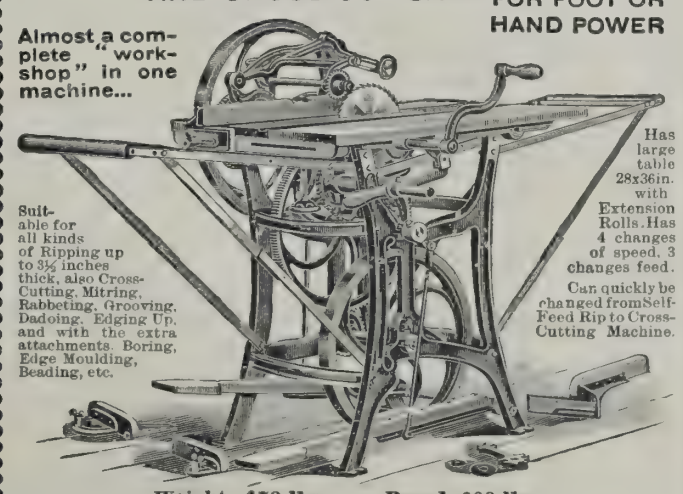

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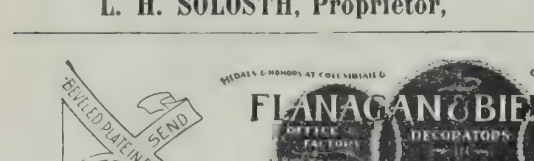

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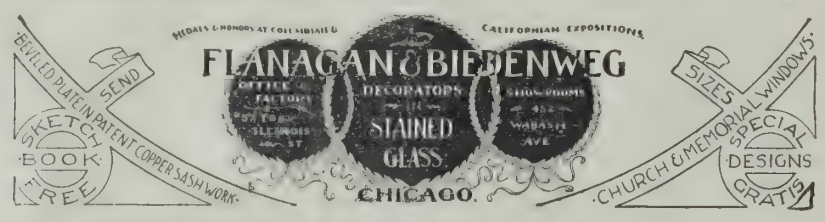

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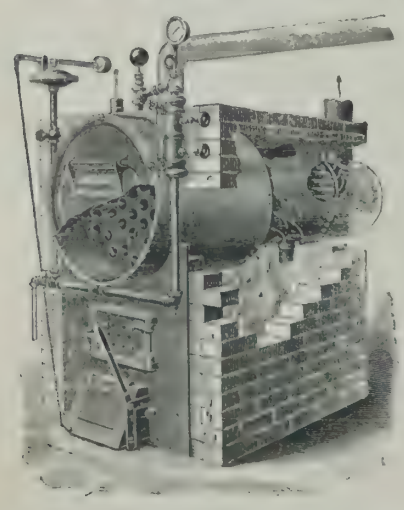

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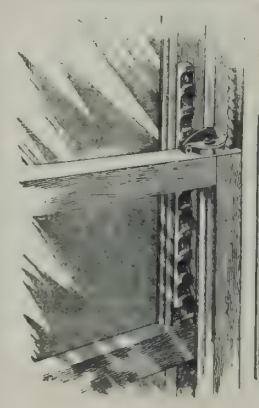

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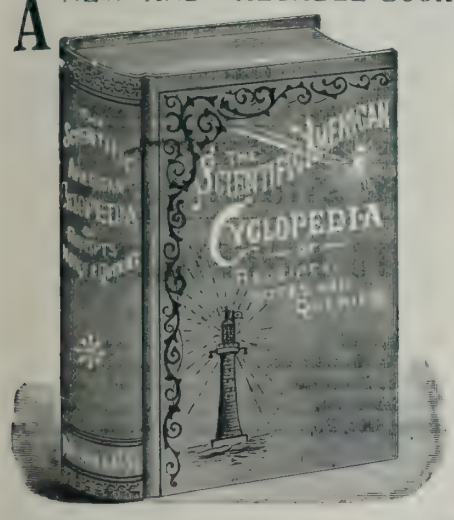

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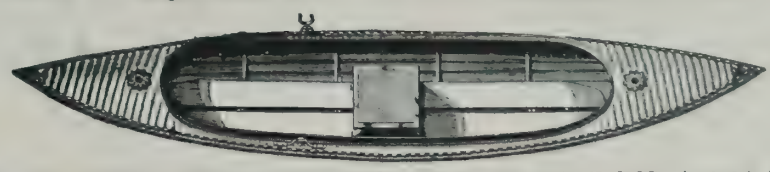

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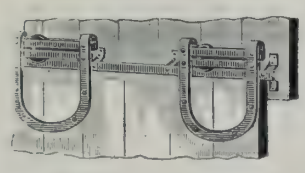

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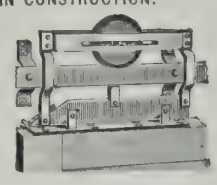

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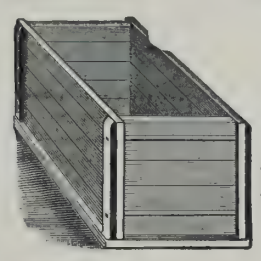

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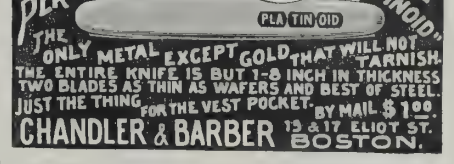

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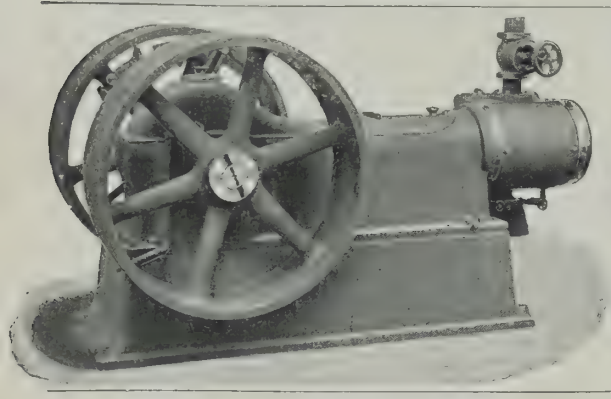

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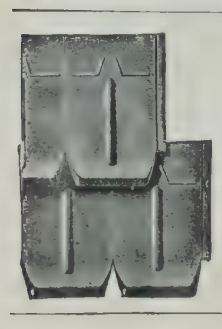

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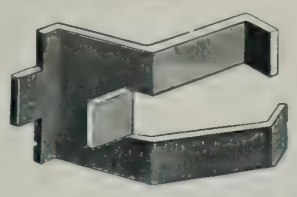

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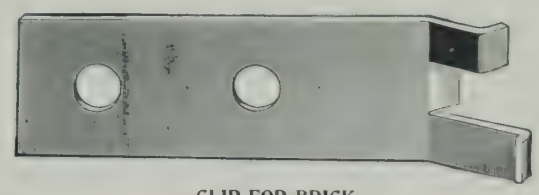

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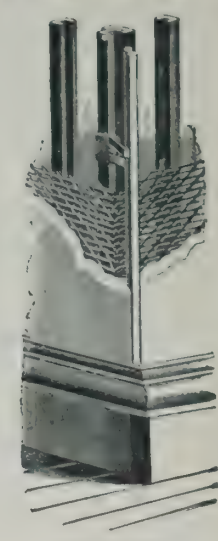

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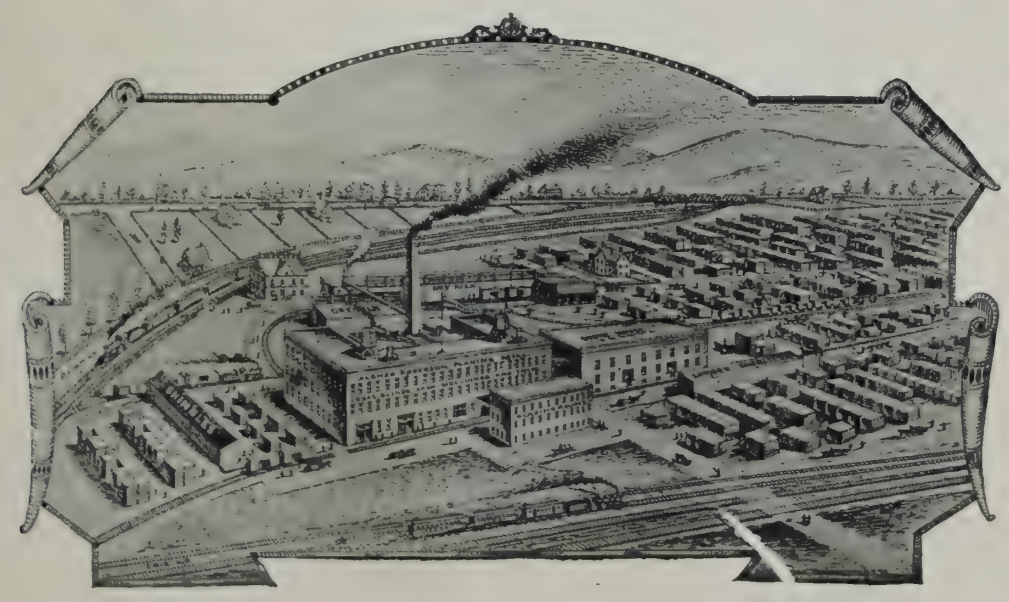

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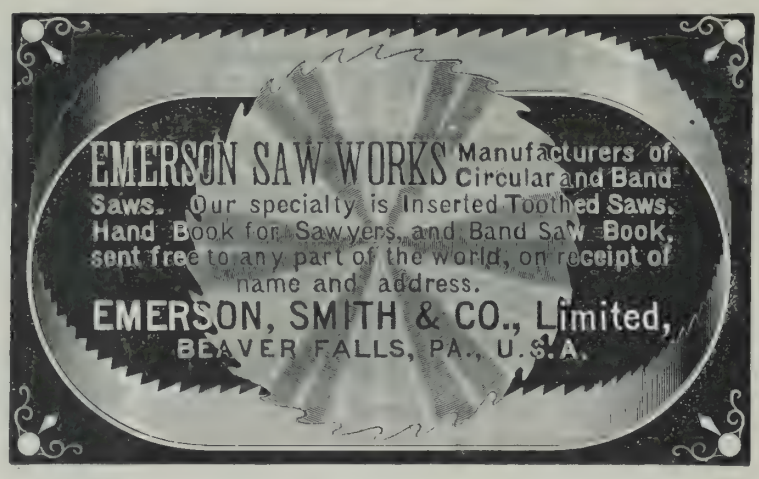

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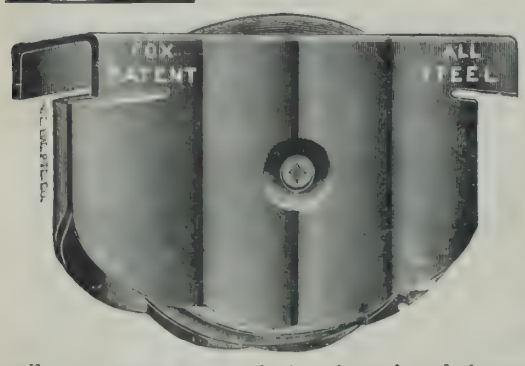

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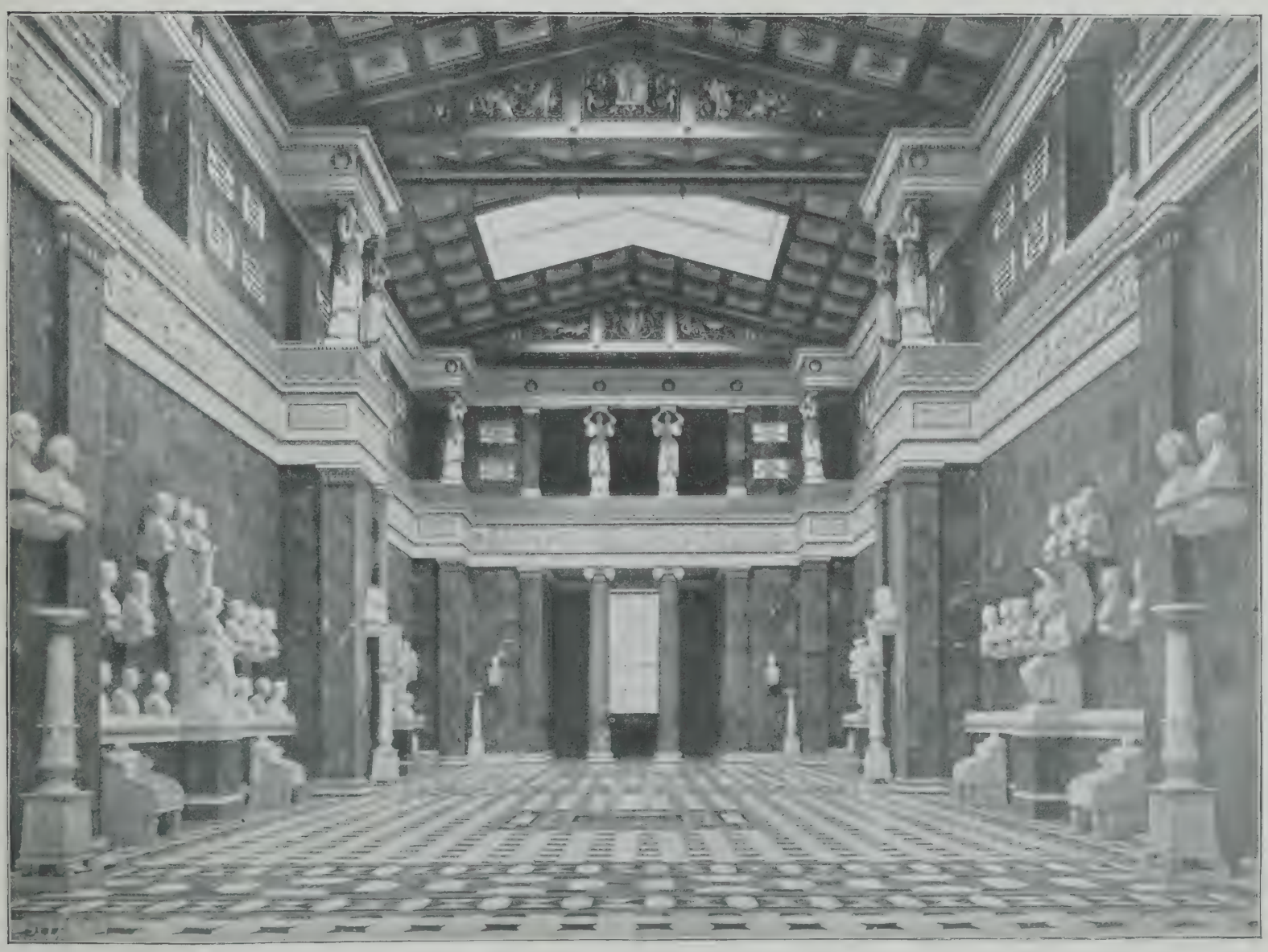

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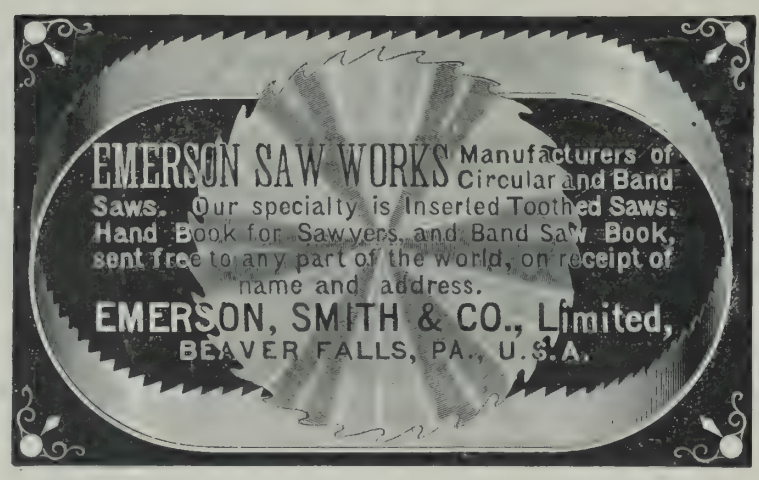

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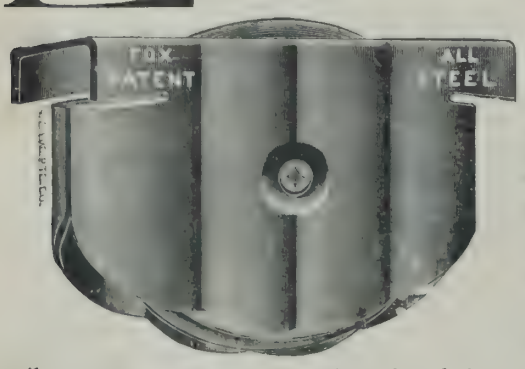

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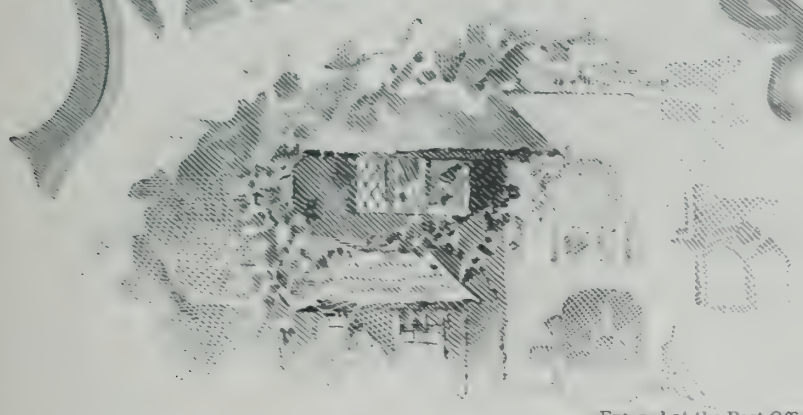

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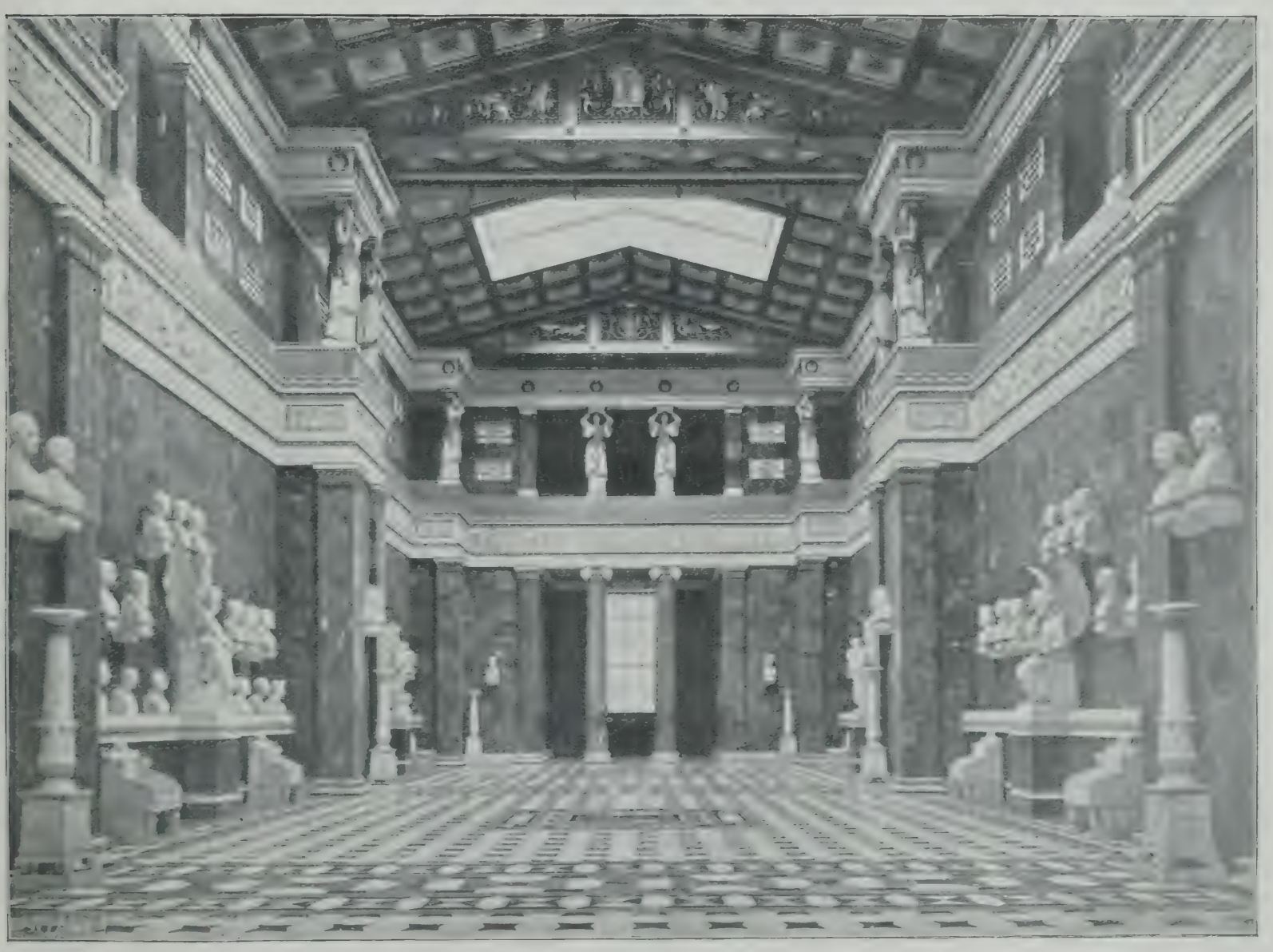

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PROGRESS IN INTERIOR DECORATION.

All the arts connected with architecture in the United States have achieved a sudden eminence during this last quarter of a century, which only a detailed history of the subject of interior decoration in this country would be able to thoroughly explain. At the present moment, when so many native artists, sculptors, and decorators are distinguished the world over for special excellence in their particular field, the outlook seems exceedingly bright, with the promise of still further success and patronage, despite the commercial depression, which will soon prove itself but a temporary obstacle to the resumption of general activity in all branches of trade and art; for both industry and art are now intimately connected. Naturally this change will be brought about by the employment of large capital in the beginning, upon private contracts, wherein the generous instincts of the native American will find ample scope in the opportunities afforded him in the embellishment of his home. Then men of smaller means, but with a taste enlightened by the effect of their environment by the elegance of art employed in pretentious designs, will imitate on an inferior scale—most probably in suburban life—this refinement and cultivation. This has been the experience in connection with American domestic life ever since the Philadelphia Exposition of 1876.

Before that period, general information and individual taste were on a very low plane, compared with the knowledge evinced by the average householder during our present state of education in decorative art. Marcotte, though he preceded the late Christian Herter, appears to have had but little influence in inducing a change from the wretched designs and abominable contrasts in color which universally prevailed during the time preceding and immediately following the Civil War. Out of this chaos arose the beautiful creations of Christian Herter.

Closely following the standard set by Christian Herter, and based upon the Eastlake ideal, came Æstheticism, the fantastical developments of which brought its devotees into much ridicule, both in England, where it originated, and the United States. The pages of *Punch*, and many American illustrated papers, travestied its most amusing and extravagant aspects. The great success of Gilbert and Sullivan's operetta "Patience," produced in 1881, was also to some extent due to the humorous allusions to the peculiarities of the "Æsthetes." In commendation of what may be called a higher Æstheticism, Ruskin has written much to present the atmosphere of true art, while Sir Frederick Leighton and Mr. Alma Tadema in England Mr. Louis C. Tiffany and other artists in this country, are conspicuous amongst those who have, in their houses, carried such principles into effect. Among others, who were more or less associated with this movement in England, were Rossetti, Burne Jones, Holman Hunt and William Morris. When the extravagances, however, attending the movement had passed away, there was found to be left an educating influence which had impressed the true principles of decorative art upon the minds of the people. The esteem which the common field flowers have since attained in decorative schemes is a case in point. For awhile the sunflower and the daisy carried everything before them in popularity.

The design and the decoration of furniture of that day were also affected. Woodwork was painted olive green; the panels of cabinets, painted in sombre colors, had pictures of sad-looking maidens, and there was an attempt at a "dim religious" effect in rooms generally. This reaction from the garish and ill-considered colorings of the bad models of early American ideals, practically established the catholicity of taste which is prominent in the furnishing of the present day.

People just now see some merit in every style. If there is any preference at the present moment, it is for those three styles to which three French monarchs have given the names of Louis Quatorze, Louis Quinze, and Louis Seize. There is something so distinct in the development of taste in furniture indicated by these three periods, that it certainly affords a most admirable opportunity for a new departure.

The French Empire influence is about over. Like Sardou's play of "Sans Gêne," it has had its day here. The reign of Louis XIV. was the time of the artists Berain, Lebrun and Watteau, as well as of André Charles Boule, "*ciseleur et doreur du roi*," who founded a school of decorative furniture which has had its votaries and imitators ever since. The name is frequently spelled "Buhl," and the term has come to represent any similar mode of decoration of furniture, no matter how meretricious or common it may be.

The massiveness and grandeur of the best Louis Quatorze furniture are greatly admired by some connoisseurs here, but it must be admitted that the styles of the two later periods have the greater vogue. Those who favor a freer structural enrichment of rooms and redundant ornament prefer the curved endive decoration, so common in carved woodwork and its imitation in "compo" of the Louis Quinze period, which is prominent in architraves, panel mouldings, in the frames of overdoors, and in the designs of mirror frames of that reign. Doves, wreaths, Arcadian fountains, flowing scrolls, cupids, and heads and busts of women terminating in foliage are carved or moulded in relief on the walls, the doors, and the alcoved recesses of reception-rooms, either gilded or painted white, and pictures after Watteau, Lancret, or Boucher, and their schools, are appropriate accompaniments.

Furniture is made to agree with this decorative treatment. Couches and easy chairs are designed in more sweeping curves, and on a smaller scale, the woodwork wholly or partially gilt and upholstered not only with tapestry in the style of Gobelins, Beauvais, and Aubusson, but with soft colored silk brocades and brocatelles.

Light occasional chairs are enriched with mother-of-pearl or marqueterie, screens with love scenes, etc.; the stately cabinet is modified into the *bombé* fronted commode, the ends of which curve outward with a graceful sweep; and the bureau is made in a much smaller size, more highly decorated with marqueterie, and more fancifully mounted to suit the smaller and more effeminate apartment of this period. The elegant cabinet, called *Bonheur du jour* (a little cabinet mounted on a table); the small, round occasional table, called a *guéridon*; the *encoignure*, or corner cabinet; the *étagère*, or ornamental hanging cabinet with shelves; the threefold screen, with each leaf a different height, and with shaped top, are consequently familiar features in shop-windows and warerooms everywhere in New York now, all dating from the Louis Quinze period.

But the simpler architecture of Marie Antoinette's time is chosen by many others as in better taste. Broken scrolls under this régime are replaced by straight lines; curves and arches only occur when justifiable, and columns and pilasters reappear in the ornamental façade; while in interior decoration generally, representing this time, we have, instead of the curled endive scrolls inclosing the irregular panel, and the superabundant foliage in ornament, rectangular panels formed of simpler mouldings with broken corners, having a patera or rosette in each, and between the upright panels there is a pilaster of refined Renaissance designs.

In the oval medallions supported by cupids is found a domestic scene after the school of a Fragonard or a Chardin; and the portraits of innocent children in the style of Greuze replace the courting shepherds and mythological goddesses of Boucher and Lancret A return to simpler and purer lines like those of this reign indicates a relief and reaction from the over-ornamentation of the previous period. The upholstered furniture is particularly simple in design; the sofas and chairs have ordinarily, but not invariably, straight, fluted, tapering legs, which sometimes have the flutings spiral instead of perpendicular; the backs are either oval or rectangular, and ornamented with a curved riband which is represented as tied at the top in a lover's knot. Tapestry in the style of Gobelins, Beauvais, and Aubusson is used for covering, the subjects being in harmony with the taste of the time.

A COTTAGE AT PROHIBITION PARK, STATEN ISLAND.

We present herewith, on page 7, in this issue, a cottage of moderate cost, which has been erected recently for August Mayer, Esq., at Prohibition Park, Staten Island. The design is of an attractive style for a modern cottage of small dimensions. The underpinning is built of rock-faced bluestone and brick. The exterior above is covered with clapboards and painted light yellow, with white trimmings. The gables are covered with cedar shingles, left in their natural state. The roof is also shingled. Dimensions: Front, 18 ft.; side, 36 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft.; third, 8 ft. The interior is trimmed with basswood, stained, and finished in antique oak. The hall contains a unique little staircase, with spindle balusters, rail, and newel, turned out of similar wood in an ornamental manner. The parlor has an octagonal projection thrown out in front, and it connects with dining-room, which runs across the house, and is provided with an ornamental mantel of good design. The kitchen and pantries are fitted up in a complete manner, with the usual conveniences. The second floor contains three bedrooms, closets, and bathroom, the latter fitted up complete. The third floor is not finished off, but rooms could be provided if desired. Ample space is finished off for storage. Cellar contains furnace, and other necessary apartments. Cost $2,250 complete. Mr. John Winans, architect and builder, Prohibition Park, Staten Island.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

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THE WALHALLA OF RATISBON.

The ancient city of Ratisbon, the old capital of the Upper Palatinate, is situated on the Danube, in the heart of Bavaria. It is a pleasant old town, and in many ways it is as interesting as the better known Nuremberg. Ratisbon belongs to an earlier period than Nuremberg. Most of the streets are narrow, and many of the older houses have strong towers provided with loopholes, which bring back to mind the days when civic broils were of frequent occurrence. The interesting "Street of the Ambassadors" contains the former residences of the ambassadors to the Diet. Ratisbon possesses a small but pure Gothic cathedral. The Rathhaus is a gloomy building; here the visitor is conducted to the subterranean chambers and dungeons, and here is the rack in situ. The instruments of torture are vastly more horrible when seen in these terrible prisons than when seen behind the plate glass of museum cases. Crossing the old stone bridge of the twelfth century, the small town or suburb of Stadt-am-Hof (which is really a suburb of Ratisbon) is reached. Here the train is taken for Donaustauf, where the famous Walhalla is located. The little, narrow gauge train runs for six miles through a beautiful country.

The Walhalla derives its name from the "Hall of the Chosen," the paradise of the ancient Germanic tribes. It is a costly reproduction of the Parthenon at Athens. It is built on a densely wooded hill 323 feet in height. From the village of Donaustauf the ascent is made by a carriage road, or a foot path, which ascends to the grand flight of 250 steps by which the edifice is approached. This "German Temple of Fame" is an architectural folly begun by King Lewis, of Bavaria, in 1830, after designs furnished by the architect Kleuze. It was finished in 1842, at a cost of about $6,000,000. This temple is devoted entirely to the display of the busts of distinguished Germans, and has no utilitarian value, and is a crowning example of how money can be misspent. The building proper is a pure Doric temple, 246 feet long, 115 feet wide and 69 feet high. The building rises from massive substructions, which somewhat dwarf the building itself. It is built of unpolished gray marble, and is surrounded by fifty-two fluted columns. The pediments, both in front and in the rear, contain groups in marble by Schwanthaler; the one toward the south represents "Germania regaining her liberty after the battle of Leipsic"; north, the "Hermannschlacht," or battle of Arminius. The roof is constructed of iron, and is covered with copper. The interior is of the Ionic order, and consists of a superb hall 180 feet long, 50 feet broad, and 56 feet high. The ceiling is richly gilded; it is deeply coffered, and the rosettes are particularly rich. The lateral walls are divided into six sections by four projecting buttresses flanked by pilasters. As will be seen on the first page, the walls are divided into two parts by a rich frieze by Wagner, representing, in eight sections, the history and life of the German people down to the time of the introduction of Christianity. The ceiling is supported by fourteen caryatides, which, in this case are Walkyries (Walküren) or warrior maidens. The decoration of the walls consists of busts which number over one hundred; they are of different sizes, and of different artistic merit; they are arranged in formal rows, and the result is rather lugubrious. The lowest ones are supported by pedestals, the upper ones by consoles. The busts include those of Goethe, Schiller, Dürer, Luther, Lessing, Mozart, Kant, Blücher, Frederick Barbarossa, etc. The busts are arranged chronologically, and are separated by six admirable Victories by Rauch. Above the upper moulding are laurel wreaths in bronze, and let into the wall are sixty-four marble slabs containing the names of the celebrities who are admitted to a position on the walls of the Temple of Fame. At the farther end is the "opisthodomos," separated from the principal hall by two Ionic columns. The general effect of the interior is grand and impressive, although it must be admitted that it partakes of the funereal. The association of classical architecture, barbarian paradise and modern German celebrities is incongruous. The floor is so fine that no visitor is admitted until he dons immense felt slippers. The views of the dark slopes of the Bavarian forest and the Danube are very fine.

At Kelheim, 18 miles from Ratisbon, is another building erected by King Lewis the so-called "Befreiungshalle," or Hall of Liberation. It is a classical edifice built by Gärtner and Kleuze. A rotunda, 191 feet in height, is borne by a substruction 23 feet high, reached by a flight of 84 steps. It abounds with fine sculpture and detail. The sanity of building constructions of this kind miles from anywhere may be questioned, and though the building mania did not die out in Lewis' family with his death, it is satisfactory to note that, while money has been squandered as freely, its expenditure has at least resulted in the erection of habitable palaces and hunting lodges.

THE WALHALLA OF RATISBON.

A RESIDENCE AT ARDMORE, PA.

The illustrations and floor plans on page 11 represent the residence of Dr. Louis Olry Lusson, at Ardmore, Pa. The elevations are well treated in the Colonial style. The severity of the lines of the main building is considerably relieved by the entrance porch feature, formed by the grouping of Tuscan columns supporting the balcony above, with its slender turned balusters and square angle posts, urn topped; terrace wall, with stone piers, heavy turned balusters and rail, as well as the Paladian windows, with brick arch over, and divided upper sash. The main roof, hipped up, with elevated deck or lookout in centre, is well broken by gable and dormer features. Underpinning and piers of local stone. Structure above of brick, covered with pebble dash plaster, tinted yellow. Roof shingled and left to weather. Trimming color, cream white. Dimensions: Front, 41 ft. 1 in.; side, 34 ft. 6 in., exclusive of porch projections. Heights: Cellar, 7 ft. 6 in.; first story, 9 ft. 6 in.; second, 9 ft; attic, 8 ft. An interesting entrance feature, with wide two-panel door and side lights, opens on central reception hall, with wide stone fireplace, having mantel above. The staircase, with ornamental newel and turned balusters (ivory finish), oak treads, and cherry handrail, has seat at side. Wide arched openings lead to main apartments, each having two wide mullioned windows. Dining-room, with angle fireplace, faced with Pompeian brick and mirror backed mantel, connects with kitchen, containing usual fixtures and large closet, through pantry, with sink and dresser. Four steps down from hall level is the doctor's office, well apart from living apartments, and convenient for alighting from and departing with carriage. Library and parlor connect by wide opening for portière, having beam over. The second floor plan shows four chambers, all with generous closet accommodation. Nursery and bathroom, with approved fixtures and plumbing, tub being of enameled iron and basin of marble. The attic is divided into three rooms and storage space, finished off. Cellar, cemented, contains laundry, servants' toilet, hot-air heater, fuel storage, etc. First floor has inside blinds. Messrs. Boyd & Boyd, architects, No. 1346 Chestnut Street, Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT OVERBROOK, PA.

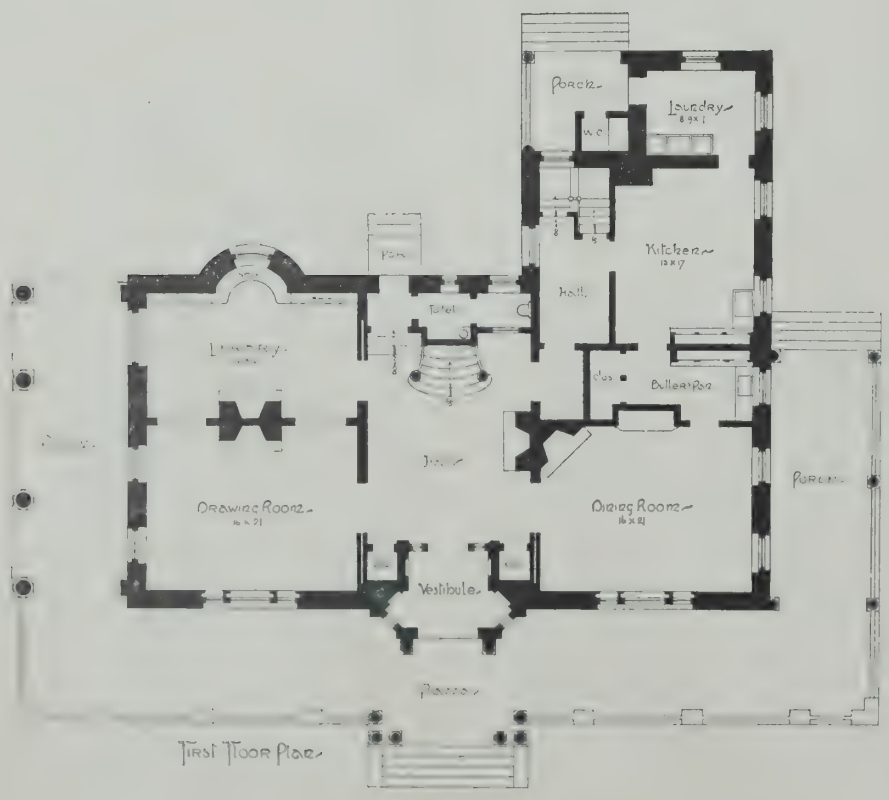
We present, as the subject for colors in this issue, and also on page 4, a residence recently completed for Frederic McOwens, Esq., at Overbrook, Pa. The design is of a unique character, with Colonial treatment of the classic order, and an effort has been made to retain as far as possible these Colonial effects. One of the most striking features is the long, overhanging roof, supported upon massive columns, with Ionic caps, rising from the stylobate to the entablature. The walls of the exterior, together with the other stonework, where shown, is built of rock-faced stone of a mixed gray color. The porches, balustrades, columns, cornices, and all woodwork are painted a soft cream white. The gables are filled in with stuccowork. The roof is covered with shingles, and left to finish a natural silvery gray color. Dimensions: Front, 62 ft.; side, 54 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft; third, 8 ft. The spacious vestibule is trimmed with quartered oak, and it has a paneled wainscoting. The hall, broad, and running through the centre of house, is trimmed with quartered oak. It has a paneled wainscoting, and also a grand staircase of oak, with ornamental columns rising to ceiling, balusters and rail, and it is lighted with a cluster of windows glazed with stained glass of delicate colors. The fireplace has an ornamental brick face and hearth, and an oak overmantel. The drawing-room is trimmed with white pine, and is treated with ivory gloss finish. The fireplace is trimmed with tiled facings and hearth, with brass trimmings, and is also fitted up with a cherry mantel, with ivory finish to match the trim. The archways between library have ornamental transoms. The library is trimmed with quartered oak, and it contains a window seat and bookcases built in, and an open fireplace, with tiled hearth and facings, ornamental backs and jambs, and a basket grate. The mantel is of oak, with columns and mirror. The dining-room is also trimmed with quartered oak, and furnished with a similar fireplace. It also has a very handsome buffet, built in, and carved in an elegant style. The kitchen and pantries are trimmed and wainscoted with white pine, and finished natural. These apartments are fitted up with the best modern conveniences. The second floor is trimmed throughout with quartered oak. It contains a large sitting-room, four bedrooms, large closets, and bathroom, the latter wainscoted, and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains billiard room in the central front, while the remainder of the space is divided into servant rooms, bedroom, and trunk room. The cemented cellar, under whole of house, contains the usual necessary apartments. It is heated from a central plant. Mr. Thomas P. Lonsdale, architect, Fourth and Walnut Streets, Philadelphia, Pa.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT LARCHMONT, N. Y.

We illustrate, on page 6, in this issue, a residence of Colonial treatment, which has been completed for William Murray, Esq., at Larchmont, N. Y. The design is pleasing, with a spacious piazza across the front, while the interior presents a plan that is most excellent. The underpinning is built of bluestone, with faces left rough as they come from the quarry. The exterior is clapboarded and painted Colonial yellow, while the trimmings and the massive cornice and frieze are painted cream white. The roof is covered with shingles, and stained a moss green. Dimensions: Front, 50 ft.; side, 32 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The hall, running through the centre of house, is trimmed with white pine, and treated in china white. The staircase is an ornamental one, with paneled seat, and column rising to ceiling and forming an archway, with overhead space filled in with ornamental spindlework; the balusters are of the spindle order, and of delicate design, while the steps are of red brick. The music-room is trimmed with sycamore, and the library with quartered oak; both have open fireplaces built of brick, with hearth and facings of same, and neat ornamental mantels, while the latter contains bookcases and paneled seat built in. The dining-room is trimmed with whitewood, stained mahogany, and is provided with china closets with leaded glass doors, and an open fireplace trimmed same as the ones already mentioned. Kitchen and pantries are wainscoted, and furnished with the best modern conveniences. The second floor is trimmed with whitewood, some of which is stained, while the remainder is treated in colors. This floor contains four bedrooms, large closets, dressing room and bathroom. The latter wainscoted and treated in china white, and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains two bedrooms and two storage-rooms. Cemented cellar, under whole of house, contains furnace, laundry, servants' bathroom and other necessary apartments. Cost, $7,700, including furnace and everything complete. Mr. Frank A. Moore, architect, No. 123 East Twenty-third Street, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.



A RESIDENCE AT OVERBROOK, PA.—See page 3.

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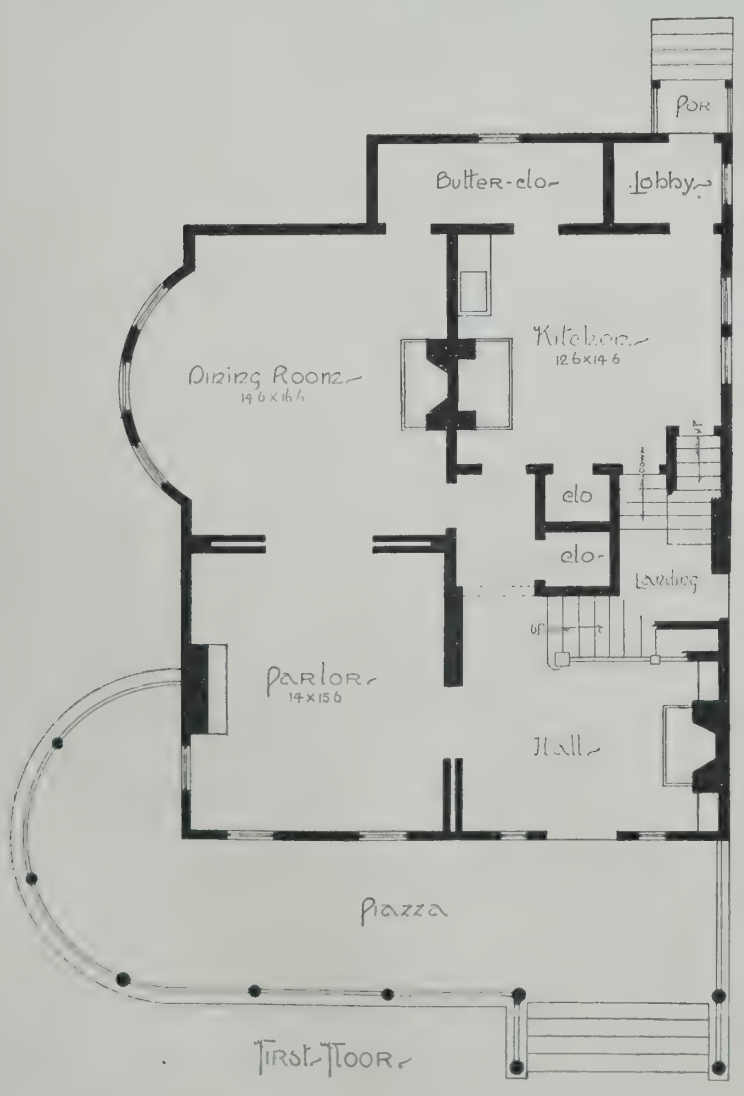

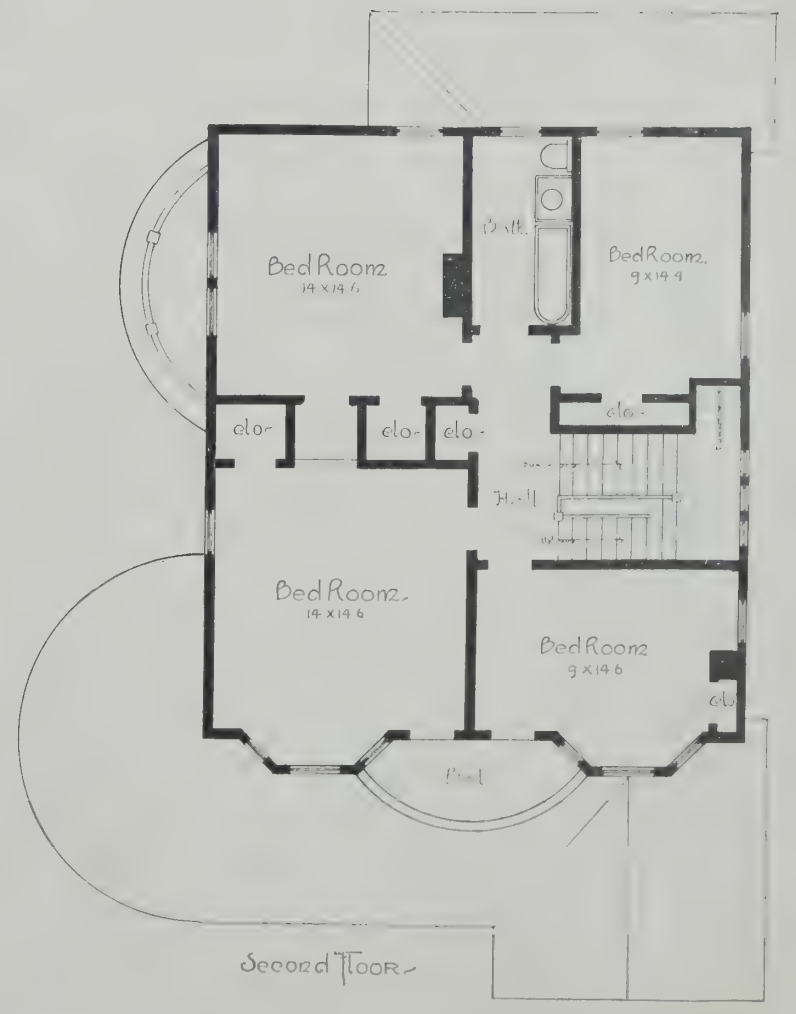

A COLONIAL HOUSE AT RICHMOND HILL, N. Y.—See page 16.

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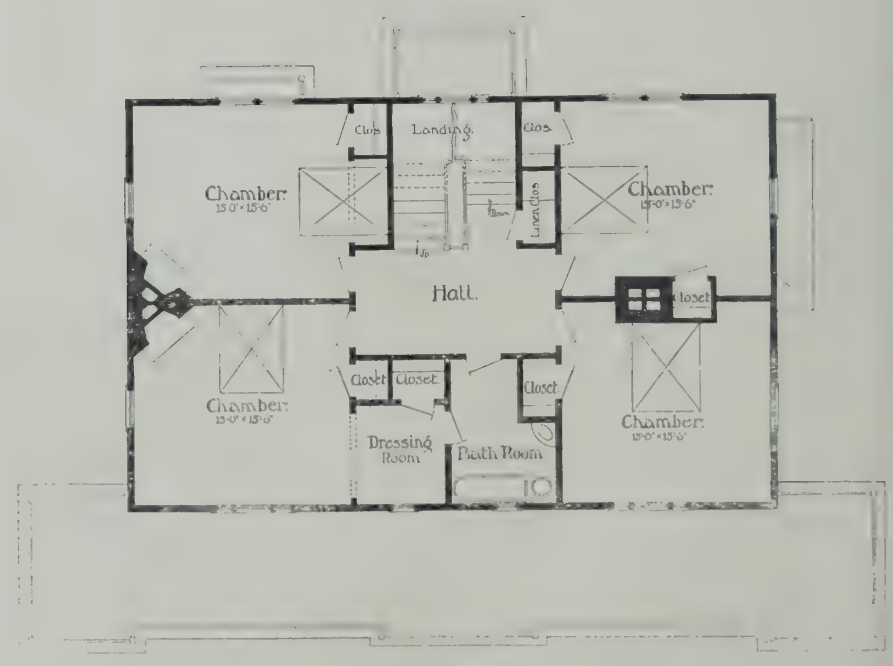
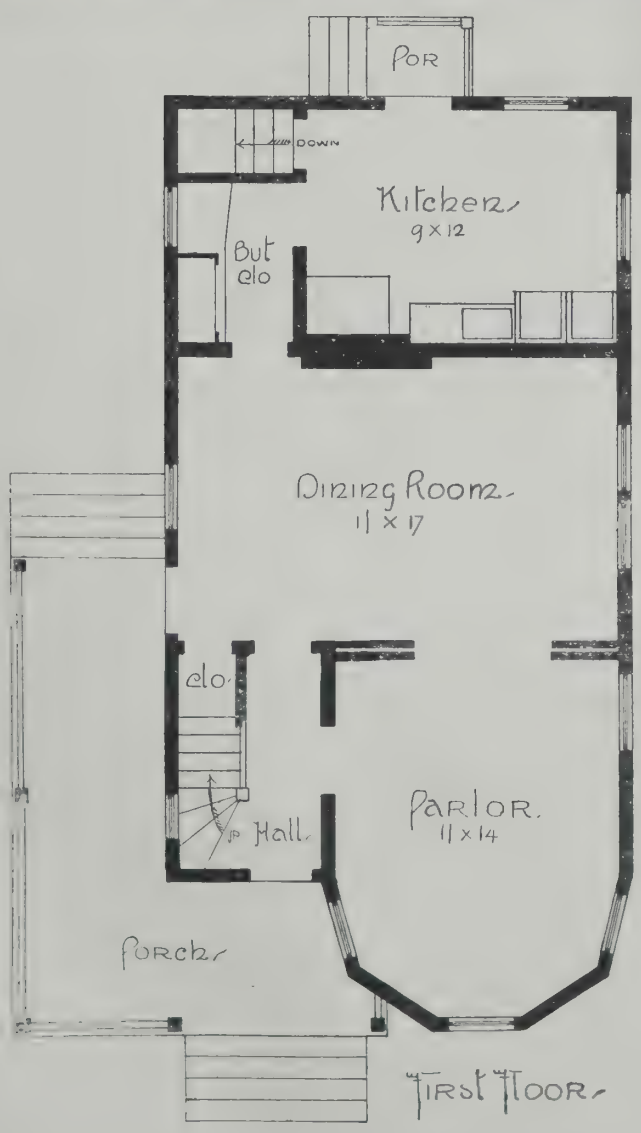
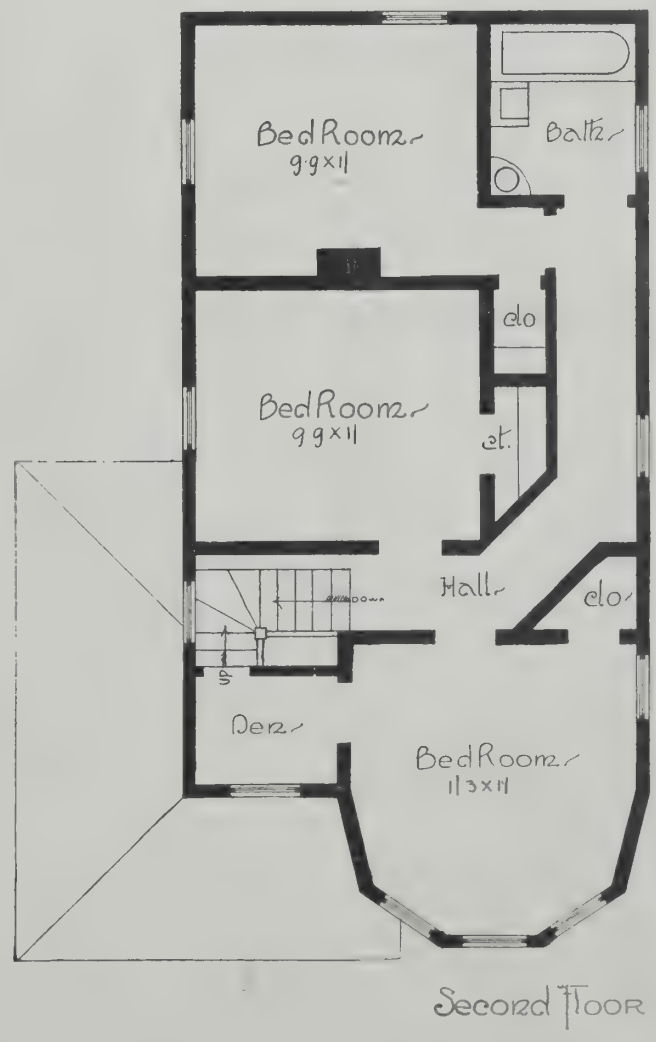
First Floor Plan.



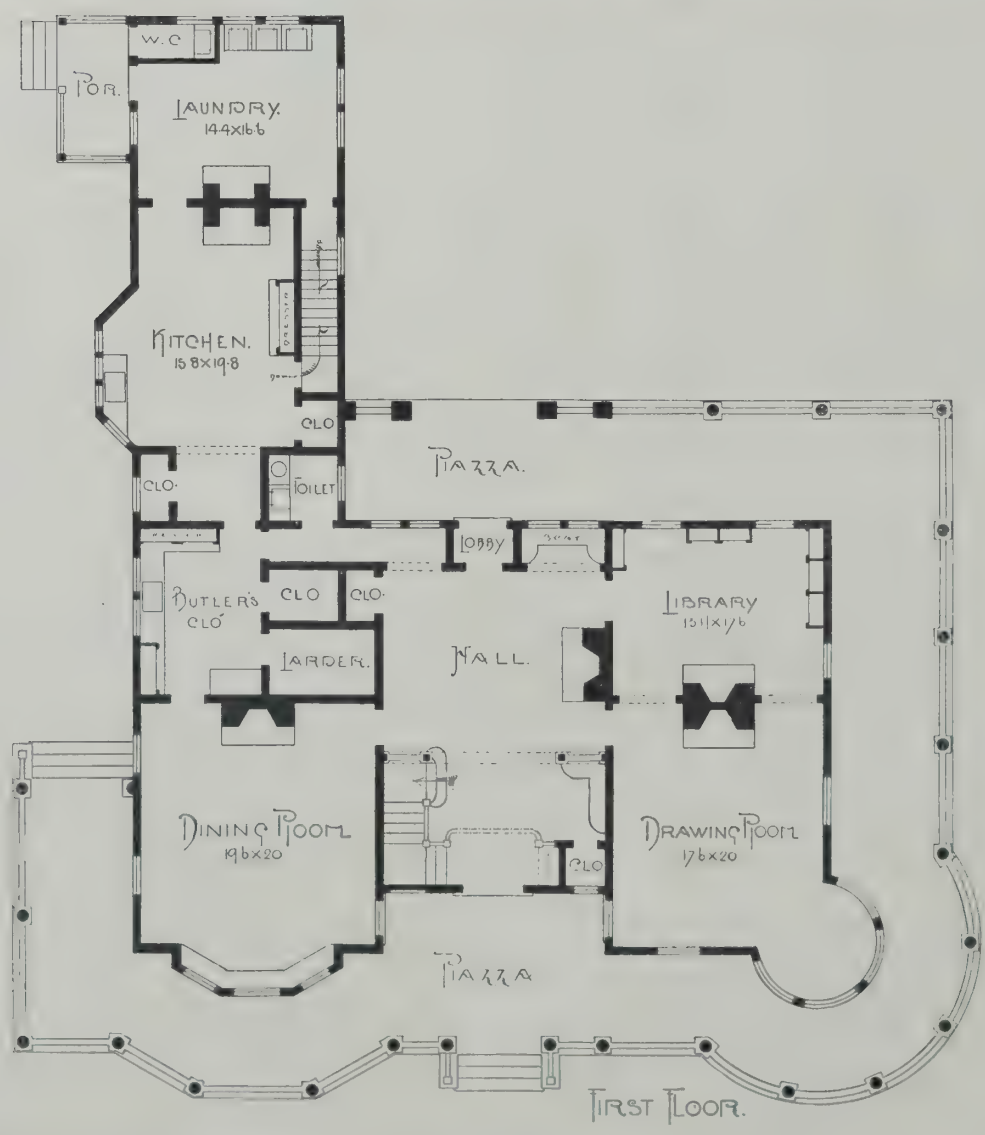
Second Floor Plan.

A COLONIAL RESIDENCE AT LARCHMONT, N. Y.—See page 3.





A COTTAGE AT PROHIBITION PARK, STATEN ISLAND.—See page 2.



"WYANDAUK," A RESIDENCE AT SOUTHAMPTON, LONG ISLAND.—See page 16.

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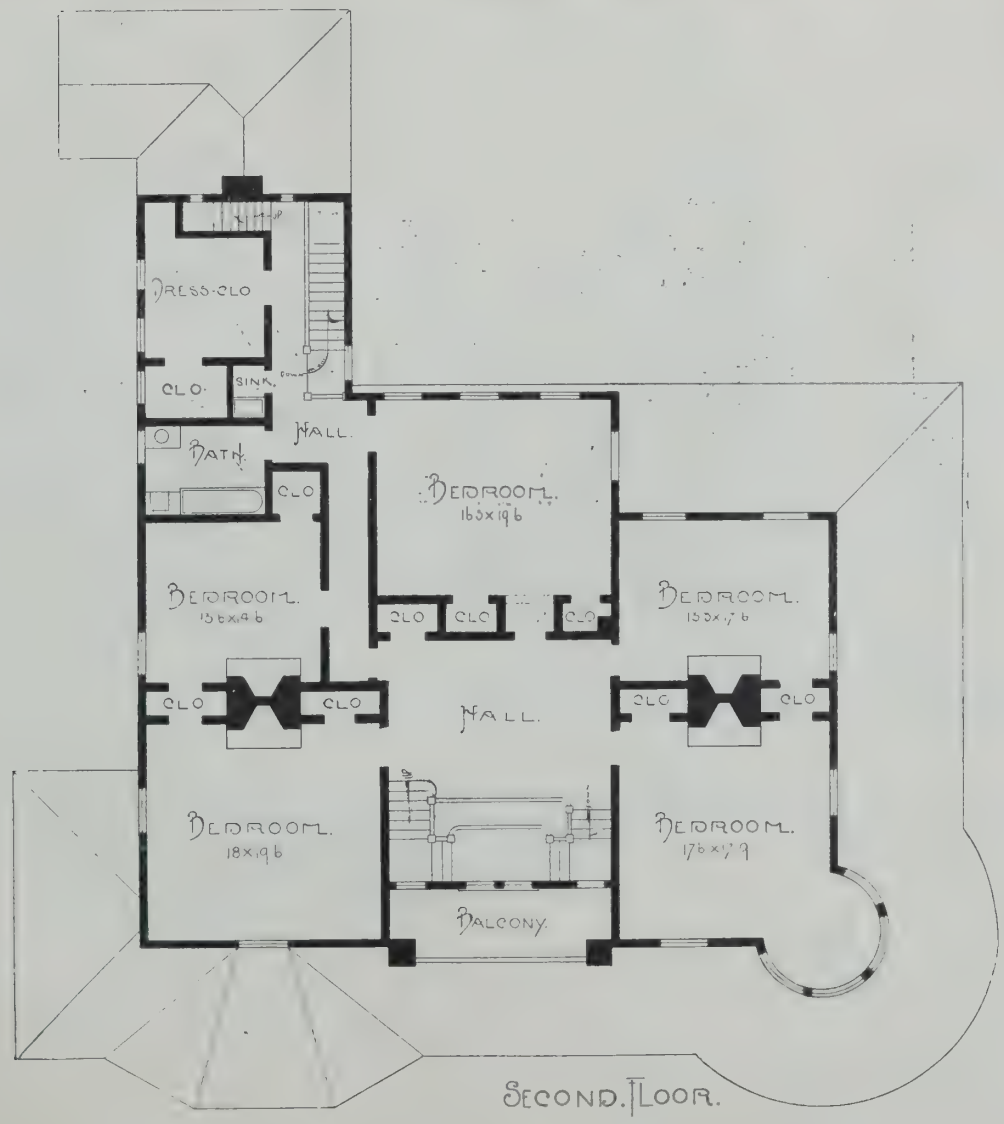

"WYANDAUK," A RESIDENCE AT SOUTHAMPTON, LONG ISLAND.—See page 16.

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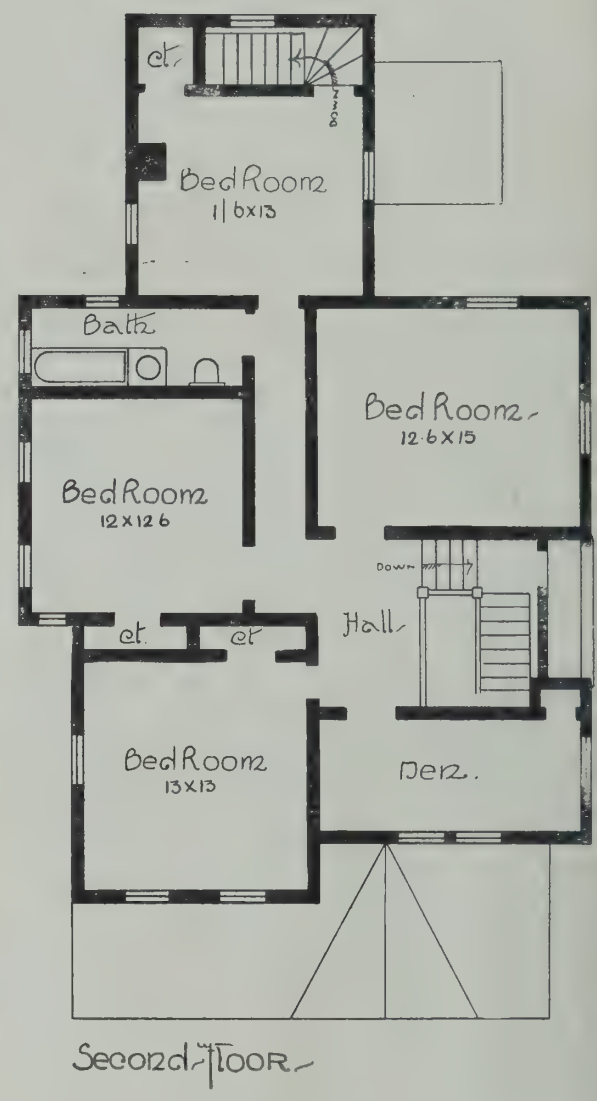
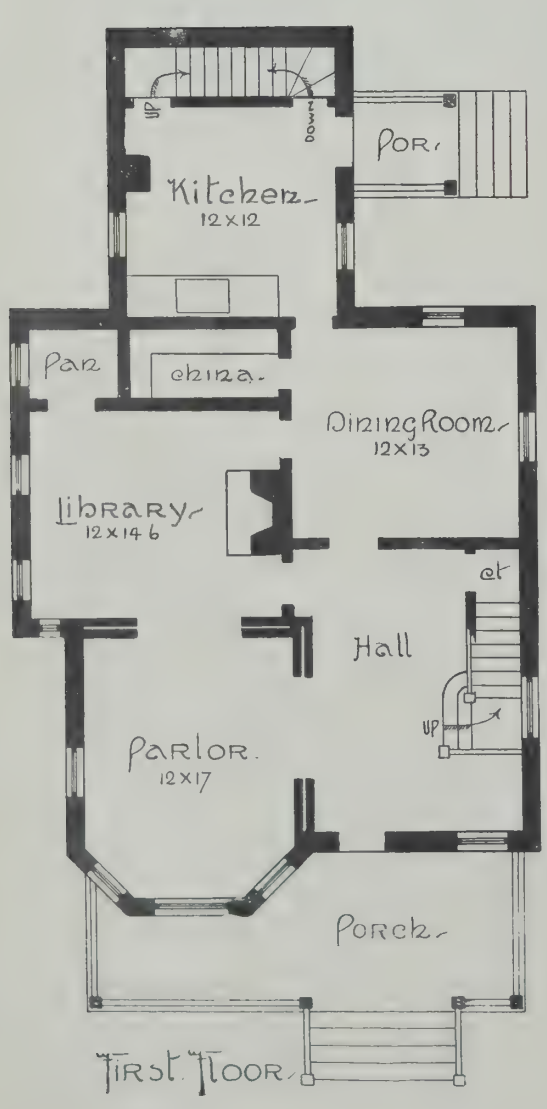
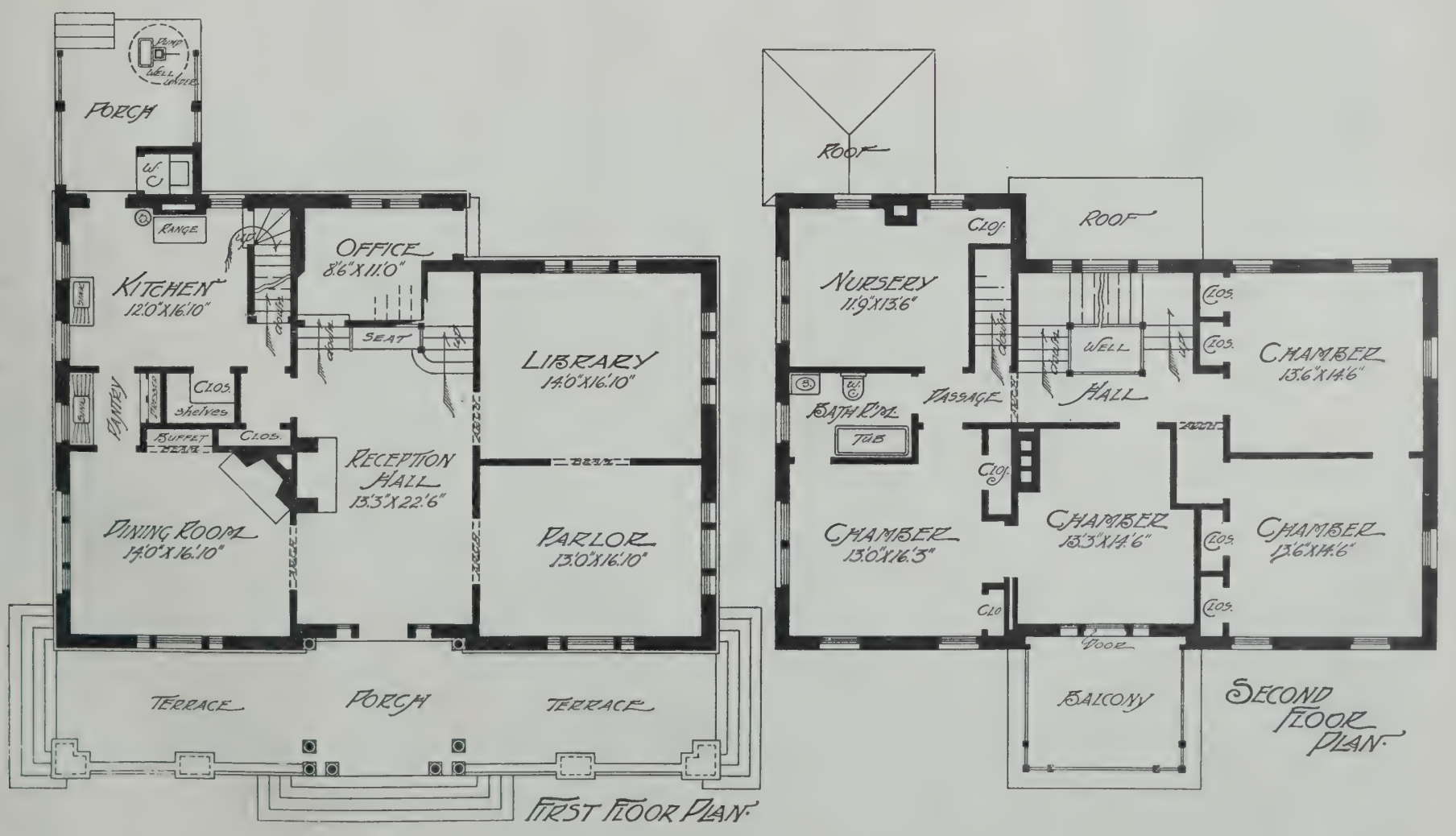




A MODERN DWELLING AT BINGHAMTON, N. Y.—See page 16.



A RESIDENCE AT ARDMORE, PA.—See page 3.

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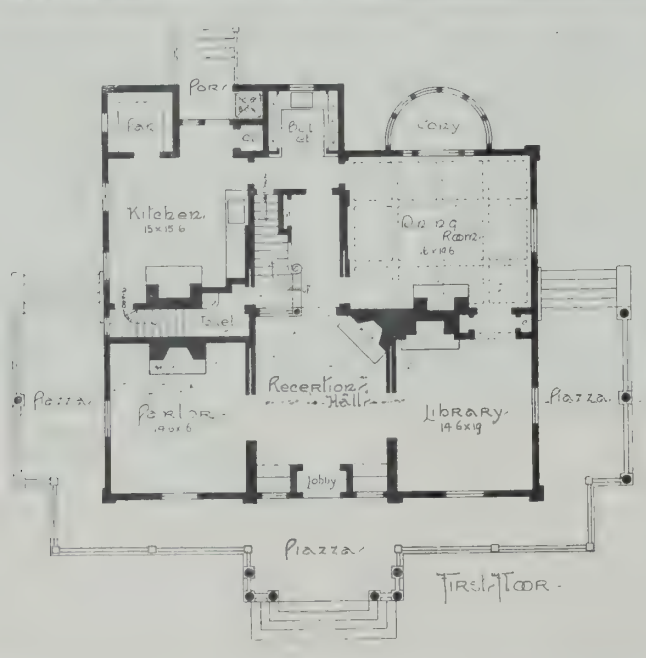
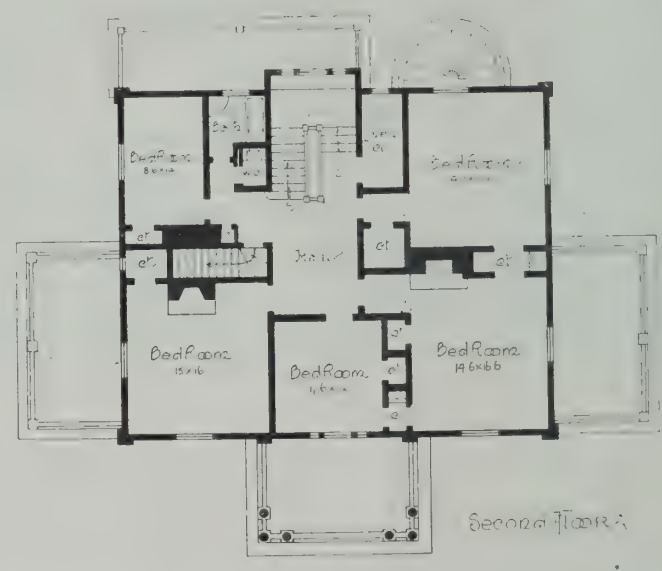
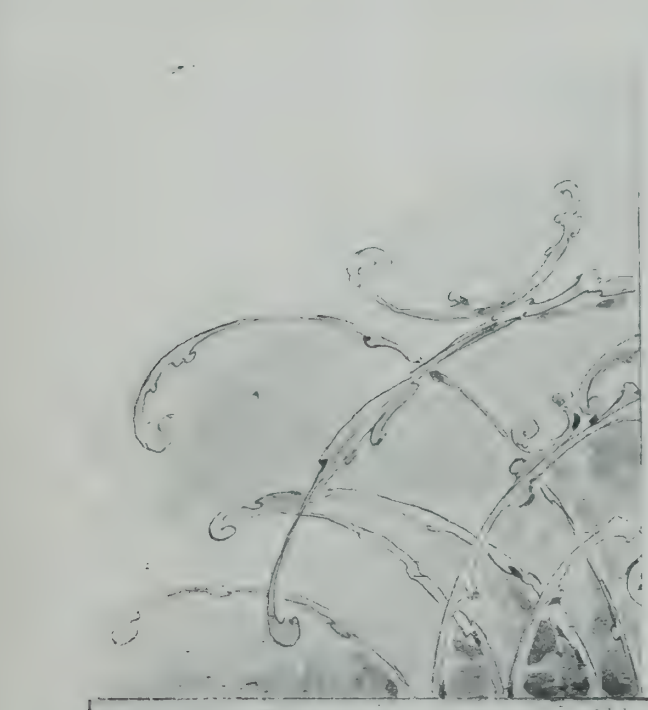
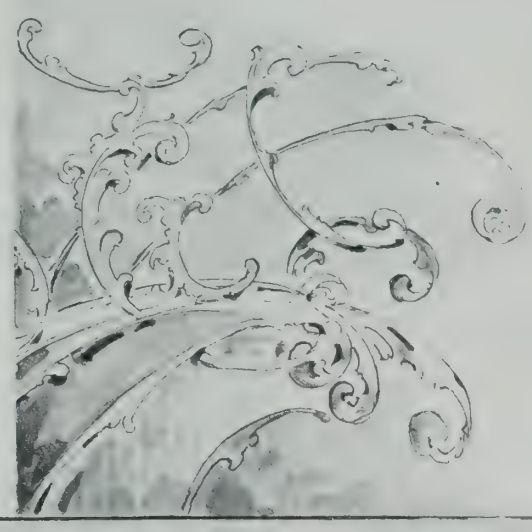
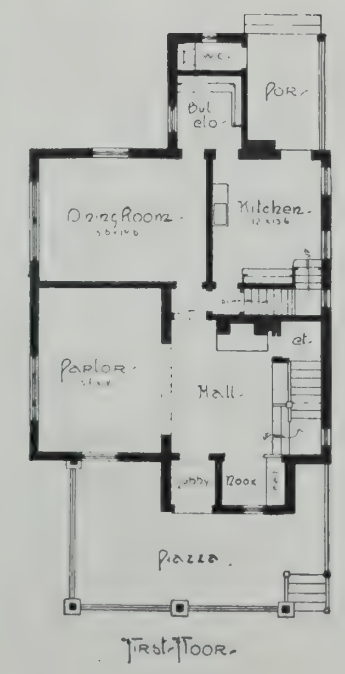




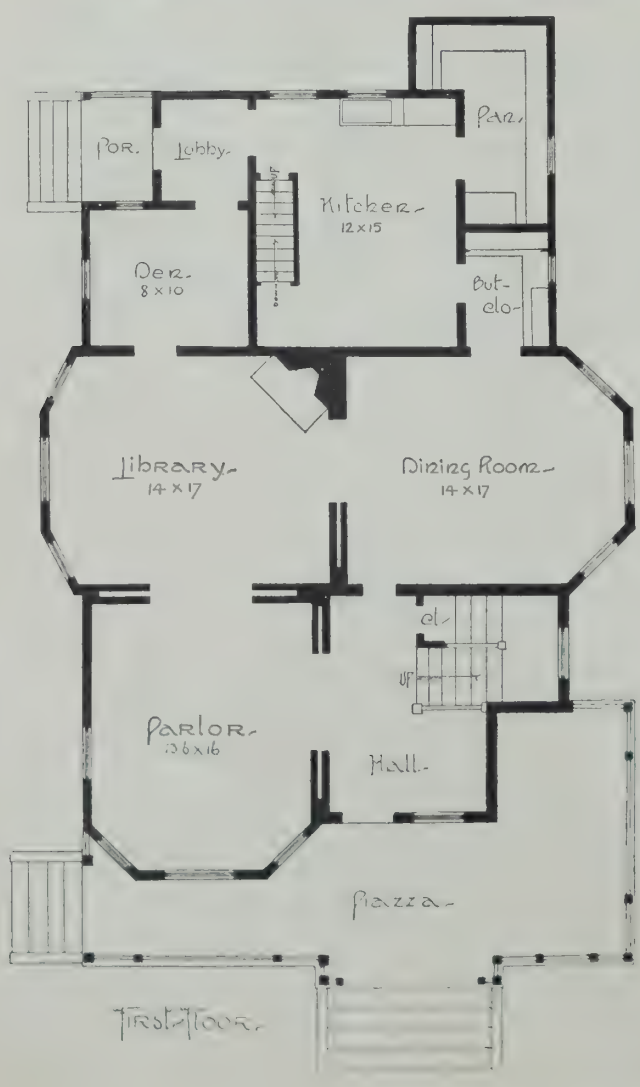
A RESIDENCE AT BENSONHURST, LONG ISLAND.—See page 16.

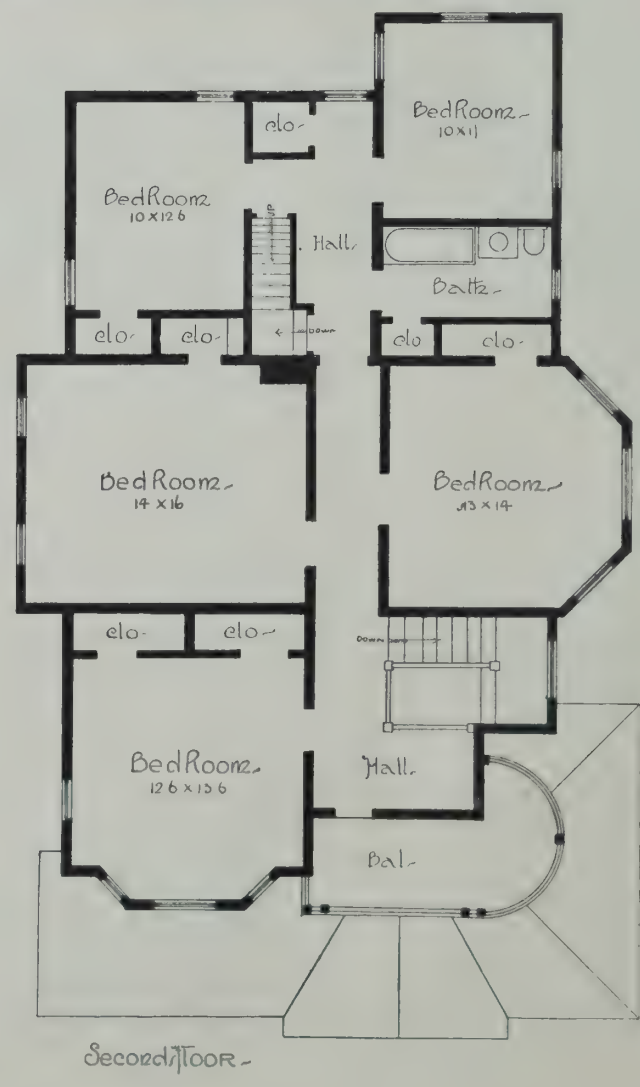






A RESIDENCE AT WEST CHESTER, PA.—See page 16.





A RESIDENCE AT ATTLEBORO, MASS.—See page 15.

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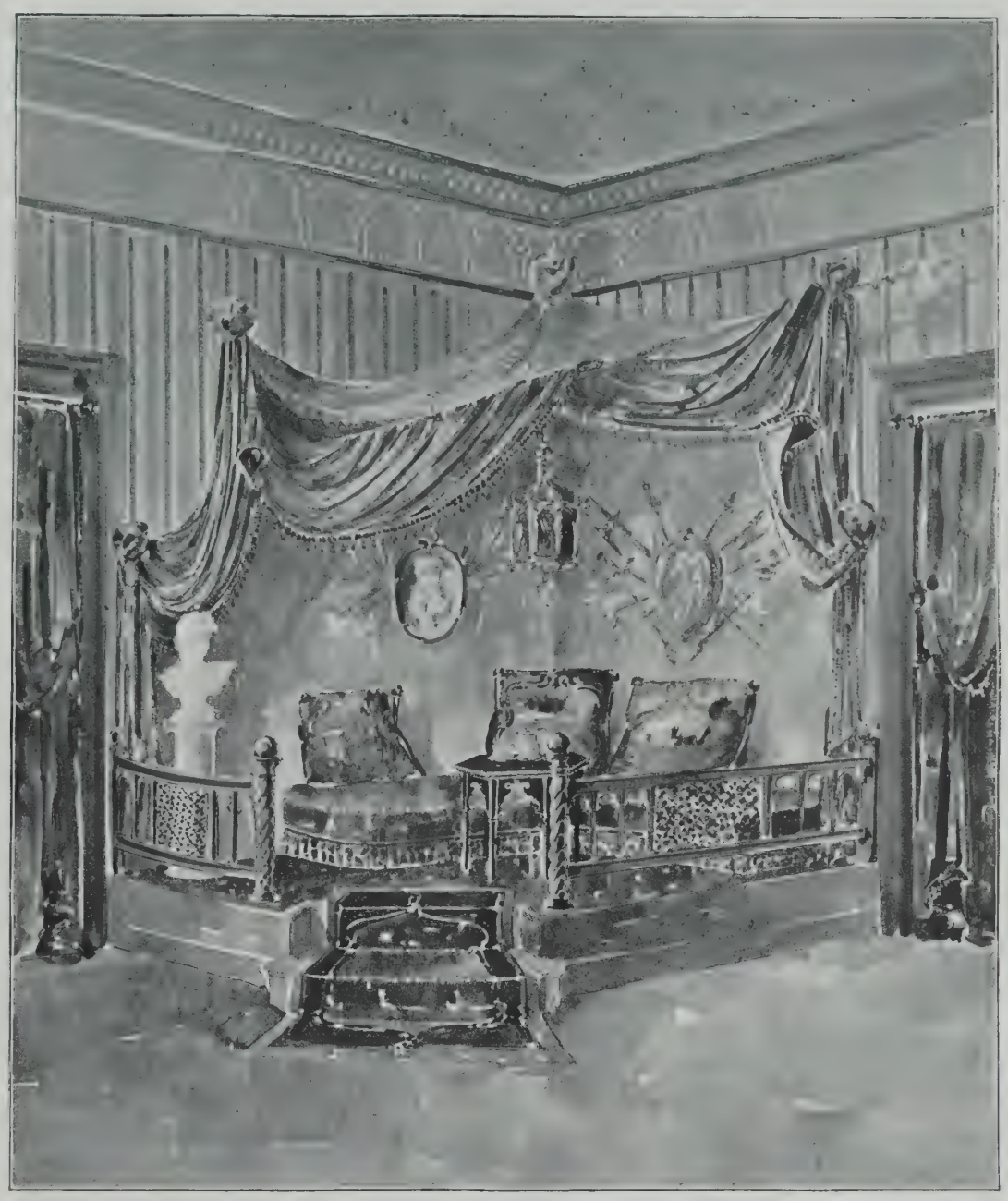
SOME IMPORTANT EXAMPLES OF INTERIOR DECORATION.

The want of novelty in the imagination of mankind was never better exemplified than in the revival of the styles of bygone periods, which posterity seems only too delighted to adopt after repeated trials of other principles Naturally, as a consequence of such a condition of things, we find ourselves repeatedly returning to the classic standard. Hence the beautiful simplicity and purity of the Grecian and Roman styles to be found in the decorative art of the Renaissance, are always a welcome contrast when rendered as effectively as in the illustration of the library of Mr. Henry L. Hotchkiss, of New Haven, presented herewith. This is a design by Messrs. Herts Bros., of New York city, examples of whose exceedingly artistic work are to be found in so many of the most important interiors which local decorative art has contributed to different parts of the country, as well as to the metropolis itself.

The room, in the best style of the Elizabethan Renaissance, is 43 ft. 6 in. by 30 ft., with an additional bay of 21 ft. by 5 ft. 6 in. The wainscoting is 7 ft. high, with bookcases all around the room. The west side of the room has a 9-foot wide mantel, elaborately carved, with Alpine green marble facing, and hearth. The connecting windows on either side of the mantel, with their richly jeweled and stained glass panes, and the seats and shelves in the recess, are the most striking features of the apartment.

The east side has a large bay window, which is 21 ft. wide and 5½ ft. deep, trimmed with a richly carved transom, is provided with comfortable seats all around, and is finished with pedestal-like projections on either side. The north side, facing a semicircular conservatory, 33 ft. in width, with marble base and mosaic floor, has as a special feature a 7 ft. 6 in. wide single sliding door, having plate glass, stained glass, and jeweled subdivisions. The south side faces the old Hotchkiss residence. The walls are covered with a greenish tapestry, and the ceiling is in stucco relief laid out in geometrical figures, in the method of the style chosen. The height of the room is fifteen feet.



DESIGN FOR A "COZY CORNER."

The design for a "cozy corner," which is likewise presented here, is also by the Messrs. Herts Bros. The raised platform being railed in separates it as a feature of the apartment, even more distinctly than the "baldachino," or canopy, usually does, from all the rest of the room. The character of the decoration is decidedly Oriental. The stack of arms, the weapons which serve not merely as decorations, but as practical mechanical parts of the decorative scheme itself; the low couch, with its luxurious cushions; the rug covering the floor—all have the atmosphere of the East, and are essentially pictorial. Further accent is given the *ensemble* by the little Turkish table placed within this appropriate environment, while art in its most effective guise graces the composition in the sculptured bust seen upon its elegant pedestal to the left of the design.

At a time when decoration is applied so universally for its picture-making element, irrespective sometimes of the entire harmony of any one given feature with the other parts of a design in a room, or in a house, such a suggestion as this for a "cozy corner" is a very happy one, because it can be introduced with less violence to the general character of the decoration already employed than is usually the case. A "cozy corner" is an indolent sort of a lounging nook under any circumstances, and the luxurious details of Eastern ideas are consequently more appositely employed in expressing its requirements in this special design than in many other studies of more formal schools.

A RESIDENCE AT ATTLEBORO, MASS.

We publish herewith in this issue, on page 14, a residence which has been erected for E. P. Claflin, Esq., at Attleboro, Mass. The design presents an unusually attractive exterior, with much ornamentation, very finely executed, and giving the whole an artistic and pleasing appearance. The underpinning is built of pressed brick, laid up in red mortar in a neat manner. The first story is clapboarded, and the second is shingled, and the whole painted in good taste and harmony. The roof is also shingled. Dimensions: Front, 35 ft. 6 in.; side, 47 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The hall, parlor, library, and dining-room are finished and trimmed with sycamore, while the remainder of the trim is of whitewood, with the exception of the kitchen and pantries, which are trimmed with cypress. The hall contains an ornamental staircase, with paneled wainscoting and massive newel posts. It is lighted by a stained glass window of good design. The parlor and library are connected with sliding doors, and the latter contains an open fireplace with tiled facings and hearth, and a mantel of excellent design. The den, opening at rear of library, is a convenience, and it can be utilized as an office, with outside entrance thereto, if desired. The kitchen and

LIBRARY OF HENRY L. HOTCHKISS, NEW HAVEN, CONN.

its apartments are wainscoted, and furnished with the best modern improvements. The second floor contains five bedrooms, closets, and bathroom, the latter wainscoted, and furnished with the usual fixtures and exposed plumbing. The trim throughout is finished in what is called egg-shell gloss. The windows in the principal rooms are glazed with plate glass. The third floor contains one bedroom and ample storage. Other rooms can be finished off, if desired. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $5,500 complete. Messrs. Geo. F. Barber & Co., architects, Knoxville, Tenn.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A MODERN DWELLING AT BINGHAMTON, N. Y.

We present herewith in this issue, on page 10, a modern dwelling, which has been erected for William Mannis, Esq., at Binghamton, N. Y. The design presents a good example for a modern suburban town house, and it has several good features, including a well arranged plan. The underpinning is built of rock-faced bluestone, while the first story above is built of red brick, laid up in a neat manner. The second story is covered with shingles, and stained a yellowish-red color, with a mottled effect. The gables are paneled, with the spaces between filled in with stuccowork. The roof is shingled and stained with moss green effect. Dimensions: Front, 30 ft.; side, 51 ft , not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with whitewood, finished natural The hall contains an ornamental staircase, with turned newels, posts, balusters and rail, and a stained glass window on first landing, and a door on second landing opening out upon loggia. The parlor and library have sliding door connection, while the latter contains an open fireplace, with tiled hearth and facings, and a mantel of excellent design. The dining-room is located conveniently, with large china closet at one side. Kitchen and pantries are wainscoted, and furnished with the best modern fixtures. Second floor contains den, three bedrooms, servants' bedroom, with stairway leading to kitchen, and bathroom; the latter wainscoted and fitted up complete. Third floor contains one bedroom and ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $3,000 complete. Mr. T. Q. Lacey & Son, architects, Binghamton, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A RESIDENCE AT BENSONHURST, L. I.

The engravings, on page 12, illustrate a residence recently erected for Thomas A. Ritson, Esq., at Bensonhurst, L. I. The design is of a purely Colonial mansion style of architecture, with square outlines and sufficient ornamentation and detail to give it a chaste appearance. The underpinning is constructed of rock-faced bluestone. The superstructure is covered with sheathing, paper, and clapboards, and then painted a silver gray, with white trimmings. The roof is shingled and left to weather finish. Dimensions: Front, 46 ft.; side, 44 ft., not including porches and piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The entrance is through a lobby paneled with oak; it is provided with pleasant nooks on either side, with seats and stained glass windows. The reception hall is trimmed with antique oak, and is furnished with paneled wainscoting and an open fireplace, trimmed with tiled hearth and facings, and a mantel with mirror of excellent design. The staircase is a very handsome one, and it has a column extending to ceiling and forming an arcaded effect; the newel post is formed of a cluster of spindle balusters. The floors throughout are laid with oak and highly polished. The parlor is treated in china white, and is provided with fireplace, with white onyx tiling for facings and hearth, and a mantel handsomely carved and in keeping with the trimmings of the apartments. The library is trimmed with oak, and it has bookcases built in, and an open fireplace. Dining-room is trimmed with oak, and it has a paneled wainscoting and a beamed ceiling. The fireplace has a massive mantel, with columns. The butler's pantry and kitchen, and its apartments, are trimmed and wainscoted with yellow pine, finished natural, and each apartment is fitted up with the best modern conveniences. The second floor is trimmed with birch. It contains a large, open hall, five bedrooms, and bathroom; the latter is wainscoted with narrow beaded stuff, and is furnished with porcelain fixtures and exposed plumbing. The third floor contains one bedroom and ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Messrs. Parfitt Bros., architects, Garfield Building, No. 26 Court Street, Brooklyn, N. Y.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

"WYANDAUK," A RESIDENCE AT SOUTHAMPTON, LONG ISLAND.

We publish herewith, on pages 8 and 9, in this issue, "Wyandauk," the country residence of Lieut. Morton, at Southampton, Long Island. The whole treatment of the design is most excellent, and it is carried throughout in the Colonial style. The broad, spacious piazza, balcony, and tower are the features of the exterior, while the interior contains many elegant apartments handsomely finished. The building has a foundation of stone, while the superstructure above is sheathed, covered with shingles, and left to weather finish. The roof is also shingled. Dimensions: Front, 64 ft. 6 in.; side, 79 ft. 8 in., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft; second, 10 ft.; third, 9 ft. The main hall is one of the most elegant apartments. It is trimmed with antique oak, and has a paneled wainscoting, and a ceiling heavily beamed, forming deep panels. This hall contains a nook, with seat, a fireplace built of brick, with facings and hearth of same, and a mantel elegantly carved. The grand staircase is separated from hall proper by archways, supported on columns with carved capitals. Drawing-room is treated in the old Colonial style with yellow, white, and gold. This room is finished in an exquisite manner, and is furnished with a paneled wainscoting, and an open fireplace, provided with onyx tiles and mantel. Library is trimmed with cherry, and is fitted up with bookcases and fireplace. Dining-room is trimmed with oak. It contains a fireplace, bay window with seat, and paneled wainscoting and ceiling beams. The floors throughout are laid with oak, and highly polished. Kitchen, pantries and laundry are trimmed and wainscoted with whitewood, and finished natural. These apartments are furnished with the usual fixtures complete. The second and third floors are treated in colors. Second floor contains five bedrooms, ten closets, dress closet, and bathroom, and third floor contains three guests' bedrooms, large closets, and dressing-room besides two servant bedrooms, two trunk rooms, and cedar closet. Servants' hall and stairway are private from cellar to third floor. Bathroom is furnished replete. Cemented cellar contains furnace and other apartments. Mr. James Brown Lord, architect, No. 160 Fifth Avenue, New York.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A COLONIAL HOUSE AT RICHMOND HILL, N. Y.

The engraving, on page 5, in this issue, illustrates a wooden house, Colonial in treatment, which has been erected for Messrs. Haugaard, at Richmond Hill, N. Y. The design is very unique in its character and style, and while the elevations are attractive and pleasing, the plans are equally so in their arrangement. The underpinning is built of rock-faced stone. The exterior framework is covered with sheathing, paper, and clapboards, and then painted pearl gray, with ivory white trimmings. The hardwood columns at piazza are oiled, and finished natural. The roof is covered with shingles, and treated with natural finish. Dimensions: Front, 33 ft. 6 in.; side, 39 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The hall is a unique apartment, is finished in oak, and contains an ornamental staircase, turned, and provided with a stained glass window on first landing. The fireplace in this hall is built of brick, with hearth and facings of tile, and a seat built in on either side. The parlor is treated in cherry, and it contains a false fireplace, with tiled facings, and a mantel of excellent design, with fluted columns, rising to ceiling, and finished with carved capitals. The dining-room is finished in oak, and it has a circular bay window thrown out at side, and a fireplace, with tiled trimmings and an oak mantel. Kitchen, butler's pantry, and lobby are trimmed and wainscoted with yellow pine, finished natural, and are provided with the usual necessary fixtures. The second floor is trimmed with whitewood, finished natural, and it contains four bedrooms, large closets, and bathroom. The bathroom is wainscoted, and fitted up with porcelain fixtures and exposed plumbing. The third floor contains one bedroom and ample storage. The cemented cellar contains furnace, laundry, and other necessary apartments. Cost $4,200. Messrs. Haugaard Bros., architects and builders, Richmond Hill, N. Y.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A RESIDENCE AT WEST CHESTER, PA.

We present herewith, in this issue, on page 13, a residence which has been recently erected for Dr. Sheward Hagerty, at West Chester, Pa. The elevations present a most striking appearance, with many excellent features. The plans show an attractive interior arrangement, with the various rooms well located. The foundation is of stone, while the superstructure above grade line is built of dark stretcher brick, with half-timber and pebble-dash for bays and gables. The roof is covered with Vermont green slate. Dimensions: Front, 33 ft.; side, 52 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The hall is one of the most attractive apartments, and it is trimmed with quartered oak. It contains a pleasant nook with seat, an ornamental staircase with newels, spindle balusters, and leaded glass windows at side, and an open fireplace built of brick, with hearth and facings of tiles, and a mantel made from special design. The parlor and dining-room are also trimmed with quartered oak, and are spacious and well lighted. Kitchen and its apartments are wainscoted with narrow beaded stuff, and are furnished with the best modern fixtures. The second floor is trimmed with quartered oak, and it contains three bedrooms, large closets, and bathroom; the latter wainscoted, and furnished with porcelain fixtures and exposed nickelplated plumbing. There are two bedrooms and trunk room on third floor. Cemented cellar contains furnace, laundry, and other necessary apartments. Mr. Edward S. Paxson, architect, No. 729 Walnut Street, Philadelphia, Pa.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

Fatalities to Workmen.

Building operations have always been fruitful in accidents, both from carelessness of workmen and from lack of care on the part of contractors to provide good scaffolds and proper safeguards against accidents. This matter has formed the subject of frequent legislative acts. Guard rails have been required on scaffolding, and recently a law has been passed requiring the placing of the floors in buildings as the work progresses, so that the danger of falling from upper stories may be limited as much as possible.

Persons observing the work in progress on our tall skeleton structures will see that the iron men expose themselves to great risks, where a single false step or a lack of nerve would precipitate them to their death in an instant. Recently those passing the St. Paul Building, opposite the Astor House, on Broadway, may have seen a man engaged on some sculpture work on the upper portion of one of the columns on that structure, where he seemed in constant danger, and where a single moment of inattention or a mistaken move would have resulted fatally by his falling to the sidewalk, nearly 200 feet below.

In most of these cases it would seem that adjustable scaffolds might be arranged which would provide for the safety of these men. Those who remember the work on the Home Life Building, where a large amount of carving was done after the stones were put in place in the front, will bear in mind that the sculptors were protected and supported by scaffolds, largely avoiding any risk in the work. The fault does not by any means lie wholly with the builders in this matter; the men show a degree of temerity and recklessness that must be the occasion not infrequently of such accidents, and the danger these men run is the source of great care and anxiety to conscientious builders. Men who do such work must necessarily be gifted with cool heads and steady nerves, and are fully aware of the risks they run; but the consequences of these accidents do not end with them alone, but frequently bring to want helpless women and children.

The responsibility of the contractor in these cases does not cover accidents where carelessness on the part of the victim was the cause, yet it seems as though there should be some provision for the families of workmen whose daring may cause these fatalities. The very temerity which renders these men liable to such carelessness and accidents is the one quality in their mental organism that enables them to do this class of work. Men of ordinary nerve would be utterly useless for such undertakings. This fact should be taken into consideration, both by the contractor and owner, in work of this class, and it seems just that a provision should be made for the insurance of men in such hazardous employments. The law meets the case to a certain extent, and has always provided damages for injury or death resulting from neglect on the part of the employer. The law has with equal uniformity refused to allow damages where death resulted from the negligence of the person killed. Now, while this may be absolute justice, yet there is an element in this class of risks to which workmen are exposed that calls for extra compensation in case of accidents, based, perhaps, more on humanitarian lines than on those of strict justice. In fact, almost every employer recognizes this in a way, for in case of his workman being hurt he generally does something for him.

It would seem as if there should be some form of insurance to meet such cases. The employers' liability companies afford relief in cases where the contractor would be legally liable, and there are, we understand, policies known as collective that afford an indemnity for injuries or accidental death occurring to any person on the building or within the area specified, whether there is any legal liability for such action or not. These are much more expensive, and insurance companies do not like to issue them. In either case, the whole burden of cost and responsibility is thrown on the contractor. There seems, however, to be a sort of moral equity that calls for some compensation to workmen in such accidents, and that the owner, as the ultimate beneficiary of all these risks, should be compelled to provide insurance against this class of accidents. The expense of such insurance could not be very heavy, were it universally adopted, in case of great undertakings such as our monstrous "sky-scrapers," and the results would certainly be in accord with the humanitary instincts of the age.—*Architecture and Building.*

Scaffolding.

We have always been in favor of good, safe scaffolding, and in a building experience of more than thirty years, in which large numbers of men have been subject to our instruction, we have been fortunate enough to never have an accident to limb or body of any employé caused by defective scaffolds. A little extra care and labor and a trifling additional expense, devoted to this important matter at first, will insure big returns on the outlay. Make a scaffold so secure that your workmen have full confidence in its ability to carry all that is to be put on it, with safety, and the workmen will do much more work and do it better than if they were compelled to crawl around on a rickety affair, that gives notice at every movement made that it is about to tumble down.

To scaffold for a frame building is not much of a task. Movable brackets, with poles to raise or lower them, are the handiest, and the best way, to prepare a scaffold for the outside work of wooden buildings, but for inside work they are not permissible, unless the floors are not laid, when the lower ends of the poles may run into the cellar or against the foundation walls. The bracket scaffold is so well known by every workman who has ever sided a house, painted an outside cornice or hung a gutter, that it is not necessary it should be described this time, though we may do so in a future issue, as there may be some readers who would like to know more about this sort of scaffolding.

In brick and stone buildings it is better to use round poles—spruce, tamarack or balsam—for uprights, with other poles "lashed" across them at proper heights. On these cross poles, at suitable distances, lay a hardwood futtock—elm, oak or hickory—about 3 x 4 in., one end of which may rest in the wall and the other on the cross poles. On these futtocks planks or two thicknesses of boards may be placed, which will make a strong and substantial platform to work from and to carry the load of bricks, stone and mortar intended for it. This, of course, is intended for outside walls, but sometimes it may not be convenient to place the ends of the futtocks in the wall, then it is best to raise two series of upright poles, lashing cross poles to each series as described before, with the futtocks lashed to both series and to uprights and cross poles.

For inside scaffolding the same system should be followed, observing that the poles are well lashed together, and that all the ropes—or lines, as a sailor would call them—are in good order and sound. In inside work no futtocks are necessary, unless the work being done is close to the walls, and the walls are not finished, or are being repaired, a circumstance that may occur after a fire, or similar disaster, then futtocks are sometimes used, but there will have to be holes made in the wall to take in the inner end of them. Sometimes, when the buildings are lofty, as in public halls, churches, or theatres, it may be necessary to use two lengths of poles to raise the scaffold to sufficient height to get at the work requiring to be done. When this is the case, use the heavier poles below, and make the first tier of scaffolding strong and secure before attempting to build the upper tier. Lash braces in the form of a St. Andrew's cross to each set of poles, placing the brace, or tie, at the foot of one pole and at the top of another. Then, on the other side of the upright poles, lash another pole as a brace, in reverse order to the first brace. Lash the braces in the centre, and well, to every pole they come in contact with. Never make use of nails or spikes in a pole scaffolding, not even to nail boards to the poles, as by doing so the poles will soon be ruined. The second tier of scaffolding is formed by lashing poles to the poles of the first tier, bracing them in the same way as in the first tier. In many cases, if the scaffolding is extensive, it may be in some instances necessary to brace it horizontally, as well as vertically, to stiffen it and make it secure. Poles will be required to be lashed horizontally to the uprights to receive the planking for the platform, and great care should be exercised in the selection of these bearing poles, and in lashing them to the uprights, as they will require to be strong enough in every direction to bear all the strains and shocks that can possibly be cast on them. Bearing poles should not be too far apart, for that would necessitate the plank forming the platform to be too long, and consequently too weak. The workmen who are to work on the scaffold should be able to judge to what distance apart the bearing poles should be placed, though, of course, the length of the plank will have something to do in regulating this distance.

The mainly important matter to be thought of in the erection of a scaffold is that men have to risk their lives and limbs on it, and that true economy in its erection is that which makes it safe beyond a peradventure, and there should be no sparing of either time, labor or money in accomplishing that end.—*The National Builder.*

Lime Mortar in Freezing Weather.

There is a popular fallacy to which a great many masons adhere most tenaciously, that the addition of lime to cement mortar is desirable if the work is to be carried out in freezing weather. Upon what reasoning such a solution is based it is impossible to determine, though there seems to be a vague feeling that because the lime in slaking becomes very hot, it therefore must impart a certain portion of its heat to the mortar, and so retard any effect of freezing weather. This is not only illogical, but it is not warranted by facts. Lime is slaked in cold water; it is then mixed with cold sand and cold cement, and is on ordinary building operations carried a long distance through the cold atmosphere, so that by the time it is actually laid up with the cold bricks in the cold wall all heat virtue has departed and the lime is absolutely inert in caloric. So much for theory. To determine the practical effect, tests were made last winter during the course of the construction of one of our largest buildings. Upon the coldest day of the winter, when the thermometer registered below zero, two eight-inch square brick piers were constructed under as nearly as possible the exact conditions which would obtain in a wall. The piers were a little over one foot high. One was laid up with mortar composed of one part lime, two parts cement, and four parts sand. The mortar of the other was composed of two parts cement and four parts sand. The piers were allowed to stand under cover which would protect them from beating storms, but they were exposed to alternate freezing and thawing effects of the temperature during a period of about three months. At the end of that time it was found that the mortar containing lime was considerably disintegrated, so that it could be crumbled easily between the fingers, while the cement mortar, though somewhat injured by frost, was still reasonably firm and hard. The first pier was dropped to the floor through a distance of four or five feet, and was entirely destroyed, no bricks adhering to each other. Dropping the cement mortar pier through the same distance, it broke in two pieces, and not until it had been violently dashed against the floor six times was it entirely destroyed. Even then some of the bricks broke before the mortar became dislodged.

The reason for this action of the two mortars is very apparent. The addition of lime to cement mortar tends to retard the setting. Consequently there would be a considerable period during which the cold weather could act disastrously upon the mortar. Furthermore, lime mortar sets by absorbing carbonic acid from the air, a process which takes a great deal of time. Cement mortar, on the contrary, sets by crystallization, and a few moments after it is in place in the wall the outer surface has taken a sufficient set to serve as at least a slight protection against the cold, while long before the lime mortar mixture would be hard, the cement mortar would be so completely crystallized that the cold would have comparatively little effect upon it. Consequently, the addition of lime to cement mortar is a positive detriment in every sense.—*The Brickbuilder.*

How to Make a Cheap Greenhouse.

The most economical greenhouse for the trucker is probably the low, narrow house recommended many years ago by the late Peter Henderson. This kind of a greenhouse is made with the same sashes that are used in the construction of the cold frames. The house is made by setting posts in line, four feet apart, to make the side walls. These side walls are four feet high and ten feet apart, this being the width of the house. The tops of the posts should be cut to the slope of the roof, and a plate nailed thereon, on which the sashes are to rest. This plate should project inside and out so as to allow of a gutter being formed on its outer edge, for it is desirable to have a tank inside to catch the rain water from the roof for watering purposes. The ridgepole for the roof should be cut so that the ends of the sashes which are to form the roof will rest on a shoulder and come flush with the top. Each alternate pair of sashes is screwed fast to the ridgepole at the top, and to the plate at the side wall, thus forming rafters for the support of the ridgepole. The other pairs are to be hinged to the plate at the bottom, and held in place at the top by a hook, or by an iron strap punched with holes to catch on a pin on the ridgepole, so that they can be propped open to admit air to the house. If the house is to be heated by an ordinary brick flue, it should not be more than 40 or 50 feet long. A door, wide enough to admit a wheelbarrow, should be in each end, and a walk through the centre, under the ridgepole. Benches are to be made on each side, for holding soil, or for placing flowerpots or boxes. These benches, and the whole house, can be constructed of rough lumber, with the cracks battened. The house should run north and south, and at the north end a shed should be made for a workroom, and into which the furnace door is to open, so as to keep the smoke and dust from the house. The furnace is made of brick, in a pit four feet below the level of the house. The furnace should have an ordinary cast-iron door and ashpit, and the grate surface should be 18 by 30 inches. An arch is turned over the firebox, and the flue is built from the rear end on a sharp ascent to the level of the floor of the house. It should then be built along under the side benches, on a slight ascent, the whole length of the house, across the farther end, and back to a chimney at the same end it started at. The first ten or fifteen feet should always be made of brick, the remainder of six inch terra cotta pipe. The furnace should never be made smaller than this, so as to hold a good body of coal to keep up a slow and steady fire during the night without attention. The furnace may be made to burn wood, and, in that case, no grate bars will be needed, as the fire can be entirely regulated by a draught hole in the door. But a coal-burning furnace is far better, where convenient. For seed-sowing purposes, it is better to have the flue entirely boxed in under the benches, but, in this case, hinged doors should be made along walk, so as to let more heat out in the house when needed.

A house of this description can be built in some localities all complete, 10 by 50 feet, for less than $100, and no market garden is complete without some such structure. Where a large business is done, and means are at hand, it will be better to build larger houses, in a more permanent manner, and have more than one, so that different temperatures can be maintained for the requirements of different plants. In this case it will be best to heat the houses with a boiler, and the circulation of hot water or steam in iron pipes. For large houses this will be more economical in the end than a smoke flue, but much more costly at the start. But the heat is much more congenial from hot water pipes or steam than from a flue, and is better distributed—*The South.*

Making Floors Warm.

In sections of the country where a low degree of temperature is the rule rather than the exception during the winter months, warm rooms are very essential, and while the heating apparatus may be the prime factor to this end, a due regard to the construction of floors and walls will materially assist in accomplishing the object sought, and at the same time effect a saving in the amount of the fuel bills, says the *Industrial World.* One of the reasons why the floors of a frame dwelling are so frequently cold is due to the way in which the floors are built. In some cases when the joists are placed in position the spaces between them at the walls are left in such a way that the cold from the outer skin of the wall can readily enter between the ceiling and the floors. How to remedy this is described by a writer in one of our exchanges, who suggests that in all cases the spaces between the joists at the walls be lathed, and a strong coat of well-haired mortar applied before the ceilings are lathed. This precaution would make a house fifteen or twenty per cent. warmer than where it is neglected. In lower floors this method of dealing with the spaces, or some similar one, should never be overlooked, or cold feet will be the rule with those who are obliged to remain over them for any length of time in the winter. A good way to avoid cold in a lower floor if the joists rest on a stone foundation, is to "brick fill" between the joists to a level with the floors, making the brick "filling" not less than four inches thick. The bricks should be laid in good mortar, well "flushed" up to the joists and made level with the top of the timbers. In stone or brick buildings "brick filling" is generally done on the lower floor, but often in the upper stories where the walls are left thinner by the set backs, the joists rest on the steps formed by the set back, in many cases nothing being done to the wall between the joists, while the ceiling and floors are finished with nothing to prevent the cold penetrating through the thin walls to the spaces between the lath and the floor. Sometimes a careful workman will see that the brick walls between the joists are rendered with a heavy coat of mortar, which is very good in its way, and would be better if the furring ran down to the edge or step and the space lathed and plastered; but this is perhaps objectionable because of its forming places where mice or other vermin would find resting places. The better way is to brick fill, leaving a hollow space between the wall and the filling on the room side. If the projection of brick work receiving the joists is not more than four inches, the brick filling may overhang the walls an inch or so on the inside, so as to give a one-inch hollow space between the wall and the filling. As this projection would be between the joists it would be hidden from sight.

Inexpensive Country Homes.

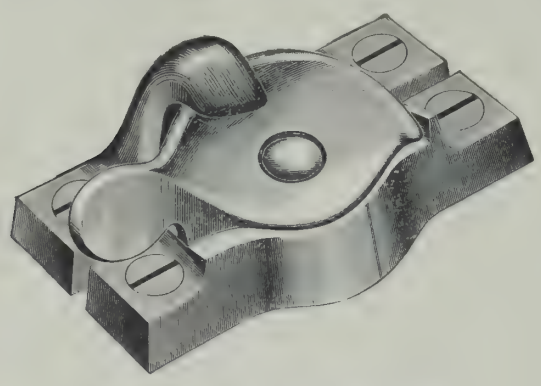
The publishers of the Building Edition of the SCIENTIFIC AMERICAN announce that they have just published a practical book for architects, builders and those intending to build, entitled "Inexpensive Country Homes." It consists of a handsome cloth bound portfolio measuring 11 x 14 inches. It contains forty-three designs with floor plans of modern country homes, ranging in price from $1,000 to $5,000 complete.

Unlike many books of this kind, the illustrations are not prepared from architects' elevations, but are taken from photographs made directly from the completed house by the special photographer of the SCIENTIFIC AMERICAN. The location of the dwellings, the cost, owners' and architects' names and addresses, are given, together with a description of the dwellings, thus enabling any one to make a personal inspection of the dwellings or to correspond with the architects.

This work is specially recommended to those who contemplate building, and to builders in towns or suburbs of cities, as it will give them most valuable ideas regarding the planning of the up-to-date country house. The book is mailed on receipt of $2. For further particulars see the advertising pages of the present issue.

AN IMPROVED SASH-LOCK.

The illustration represents a sash-lock which is impossible to open by passing a blade between the window sash on which it is applied, and which so locks the sash as to effectively prevent rattling. It is a new article recently brought out by the W. & E. T. Fitch Company, of New Haven, Conn. The thumb-piece on the lower sash is spring-held in either open or closed position, and a

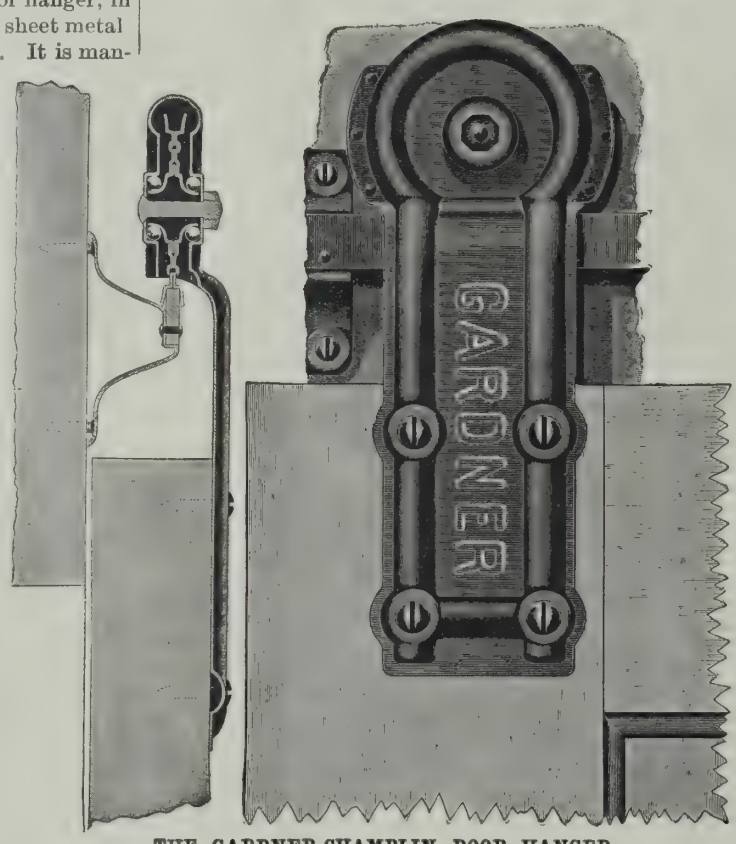


THE FITCH PATENT SASH-LOCK.

novel-shaped cam portion on its outer end slides in a corresponding keeper on the lower part of the upper sash, in such a way as to slightly lift the upper sash from the point to which it frequently rebounds or sags, drawing and holding the sash close together. The device is exceptionally strong and durable, is very simple in principle, and the parts are so well designed and carefully finished that it works with the greatest ease. Small and large sizes are made in all finishes.

AN IMPROVED DOOR HANGER.

The illustration represents a new barn-door hanger, in which the yoke and hood are stamped out of sheet metal and corrugated to give the requisite strength. It is manufactured by the Gardner-Champlin Company, 312 First National Bank Building, Chicago, Ill. Patents have been allowed on this hanger, whose construction is claimed to be on the principle of a bicycle. It is made entirely of steel, has hardened cones, and the wheel has perfect alignment, with no side motion. It has adjustable bearings, the same as those of a bicycle, there being twenty-two quarter-inch balls in each hanger, eleven in a side. The wheel cannot sag and run on one side of the track, and will hold a door in perfect position. It is neat in appearance, takes up but little room, and will carry a door weighing up to 500 pounds. It is one of the strongest and smallest hangers for the purpose ever made, and is no more expensive than the regular ball-bearing door hanger now on the market.



THE GARDNER-CHAMPLIN DOOR HANGER.

A NOVEL WOOD-WORKING MACHINE.

The accompanying illustration represents a machine especially designed for boring holes through timbers up to 8" square, and 12, 14 and 16 ft. long, or longer if desired, boring from each end to the centre. The object of this work is to prevent the checking of the timbers which is bound to occur if the core is not taken out, also to make them lighter for shipping purposes, etc., etc. Veranda posts treated in this manner are much more durable, and fetch a better price on the market. The machine is also used for boring wooden pump stock, tubing for tannery purposes, etc. The frame is of ample proportions, made of hardwood, length governed by length of timber to be bored, with sufficient floor space to insure steady running when in operation. The head stock is made to carry two pulleys, each on a separate mandrel practically, and each running at a different rate of speed, one pulley carrying the tube with the cutter auger at the end, the other pulley to rotate the spiral which is inside the tube running in an opposite direction, taking the shavings away from the auger and discharging them partially between the pulleys and at the extreme end of the head stock. Suitable steady-rests are provided to support the end of the long tube. These steady-rests are adjustable, and moved back and forth as required, according to the depth of boring. The sliding rest is very complete, of ample size to take in timbers from 3" to 8" square or round, operated by right and left hand screws, thereby self-centring the various sizes of timbers that may be brought to the machine. The feed is automatic; also operated by hand. It is very reliable, easy of access, thereby taking all the hard work from the operator. Suitable rests are supplied for the square timbers to rest in; also clamping devices for holding the stock down solid while being bored. When the machine is required for pump work, it is necessary to make a matched joint, and suitable face plates and cutters attached to a mandrel and pulley, which run in the double head stock, are provided, doing very smooth, rapid, and reliable work; in fact, making a complete joint. For further particulars, address the Egan Compan , 209-229 West Front Street, Cincinnati, Ohio., U. S. A.

Gray Bricks.

Of all the tints that are now in vogue, none stands higher in estimation than the divers shades of gray. The reason architects use gray and cream-colored stones is because on weathering they tone down so well. Now, the average brick, as typified by ordinary reds, may tone down as much as it likes, but it never presents that grand appearance characteristic of, say, Portland stone. Gray terra-cotta has made its appearance, and is being highly appreciated. At first it looks rather fresh, and in that respect agrees with the natural product alludeo to, but it will soon improve in color and take its rank accordingly. Of course, gray bricks have to be made from suitable earths, and nothing can be expected from the brick earths now ordinarily employed, as gray tints could not result from them unless mixed with chalk or some such substance, which would impair their general quality. At the same time, something might be done in that direction, especially with earths not containing an excess of lime, by the addition of certain ingredients depending on the precise character of the earths.—*British Brickbuilder.*

Dixon's Silica-Graphite Paint.

Some thirty years ago the Dixon Company began the regular manufacture of Dixon's Silica-Graphite Paint. Silica-Graphite is two or three times greater in bulk than mineral or lead paints.

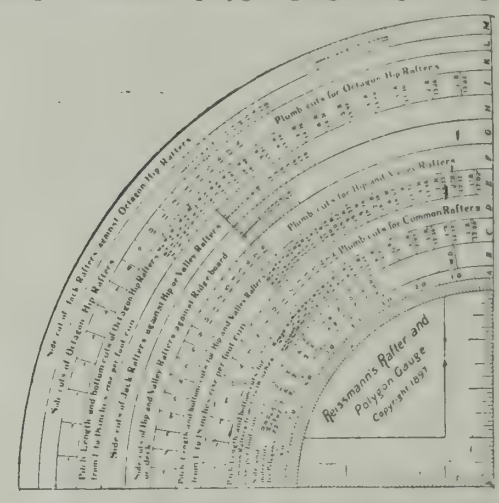
Silica-Graphite Paint differs from other pure linseed oil paints only in the pigment. The silica being very finely pulverized acts as a filler for the surfaces. Ticonderoga Graphite is a FLAKE graphite, and although the graphite is very finely ground, each little particle, when viewed through a microscope, is shown to be a flake, and these minute flakes form a fish-scale-like coating of unapproachable flexibility and durability.

After Dixon's Silica-Graphite Paint had been in the market for a number of years, and its reputation had become thoroughly established and widespread, a number of graphite paints and imitation graphite paints were put on the market in competition. These imitation paints have lacked the essential features of Dixon's Silica-Graphite Paint, and many of them have been simply mixtures of ordinary metallic paint and lampblack, while others have been made of common plumbago, usually purchased for foundry facings.

Dixon's Graphite Paint is claimed to last longer and to cover two to three times more surface than other paints. Roofs and ironwork properly painted with Dixon's Silica-Graphite Paint have not required repainting for ten to fifteen and even twenty years.

A CONVENIENT GAUGE FOR CARPENTERS AND BUILDERS.

The accompanying illustration represents in miniature an ingeniously arranged and carefully computed scale, forming a rafter and polygon gauge adapted to greatly

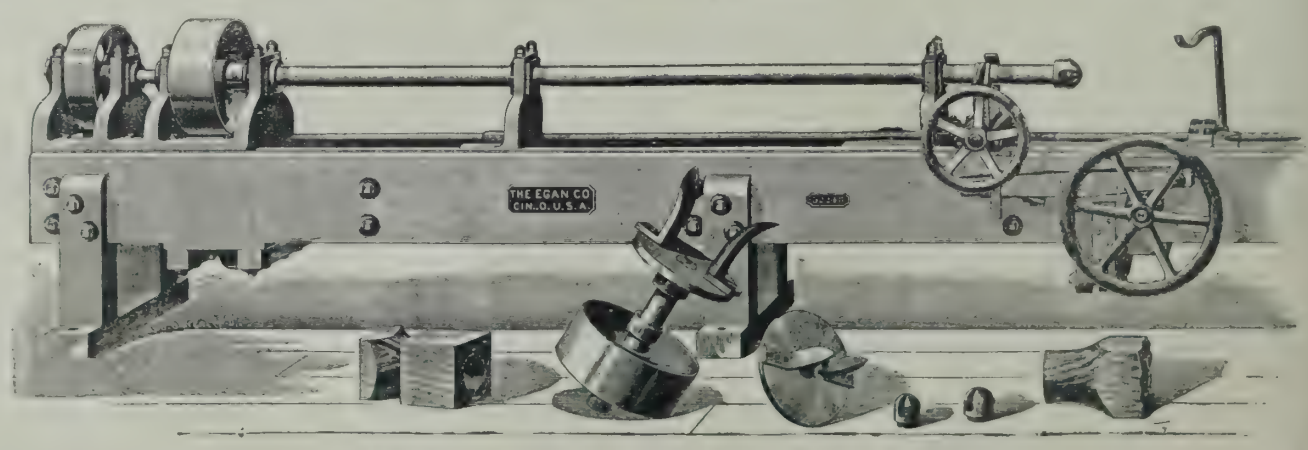


REISSMANN'S RAFTER AND POLYGON GAUGE.

facilitate the work of the carpenter and builder. It has been copyrighted by F. Reissmann, of West Point, N. Y., and is printed on heavy cardboard, 11 x 13 inches in size, rendering all its lines and inscriptions easy to read. It greatly simplifies the work for obtaining (1) the length of common hip, valley, and octagon hip rafters; (2) the pitch, plumb and side cuts; (3) the side bevel for jack rafters against trip and valley rafters, and also the side bevel for jack rafters against octagon hip rafters; (4) the mitre cuts for level planceer, gable planceer, crown moulding, sheathing, and shingles for hip and valley; (5) the correct bevel for obtaining the sides and mitres for a number of polygons. The text printed in connection with the scale fully explains the method of using it.

IN constructing the foundations for the church of St. John the Divine at New York, the Portland cement, of which nearly 10,000 barrels were used, was ground with an equal quantity of sand in a ball mill before being made up into concrete and mortar. The latter was made by adding two parts of sand to one of the ground mixture, so that in the end the mortar consisted of one part cement to five of sand. Under test it was found that this mortar, both in tension and compression, was slightly stronger than a mortar of the ordinary kind, containing one part of cement to two of sand. Again on grinding one-quarter part of cement with three-quarters of sand, and then mixing this with three parts sand, a mortar was obtained consisting of only one part cement in twelve, and this proved stronger than an ordinary mortar having one cement to one sand. In fact, it was possible by proceeding in this way to make a very fair mortar containing only one-twentieth part cement. The new method is said to give a very compact and impervious mortar, well suited for situations where watertightness is required, or in work much exposed to frost. It also works better on the trowel. The process is patented by F. L. Smidth, of Copenhagen, in which city it has been largely used, and tests have been made at the end of two or three years, which quite confirm the ordinary short date tests.

THE Cincinnati Corrugating Co., Piqua, Ohio, are just issuing a new ninety-page catalogue containing over 125 illustrations of their roofing, siding, arches, metallic bath, shutters and doors, awnings, and sheet metal workers' supplies. A supplement refers to the fact that several new items have been added since the last issue. The company have facilities that enable them at all times to insure the promptest shipment on orders. Copy free on application.



NEW PORCH COLUMN AND PUMP TUBE BORING MACHINE.

SCIENTIFIC AMERICAN

Building Edition.

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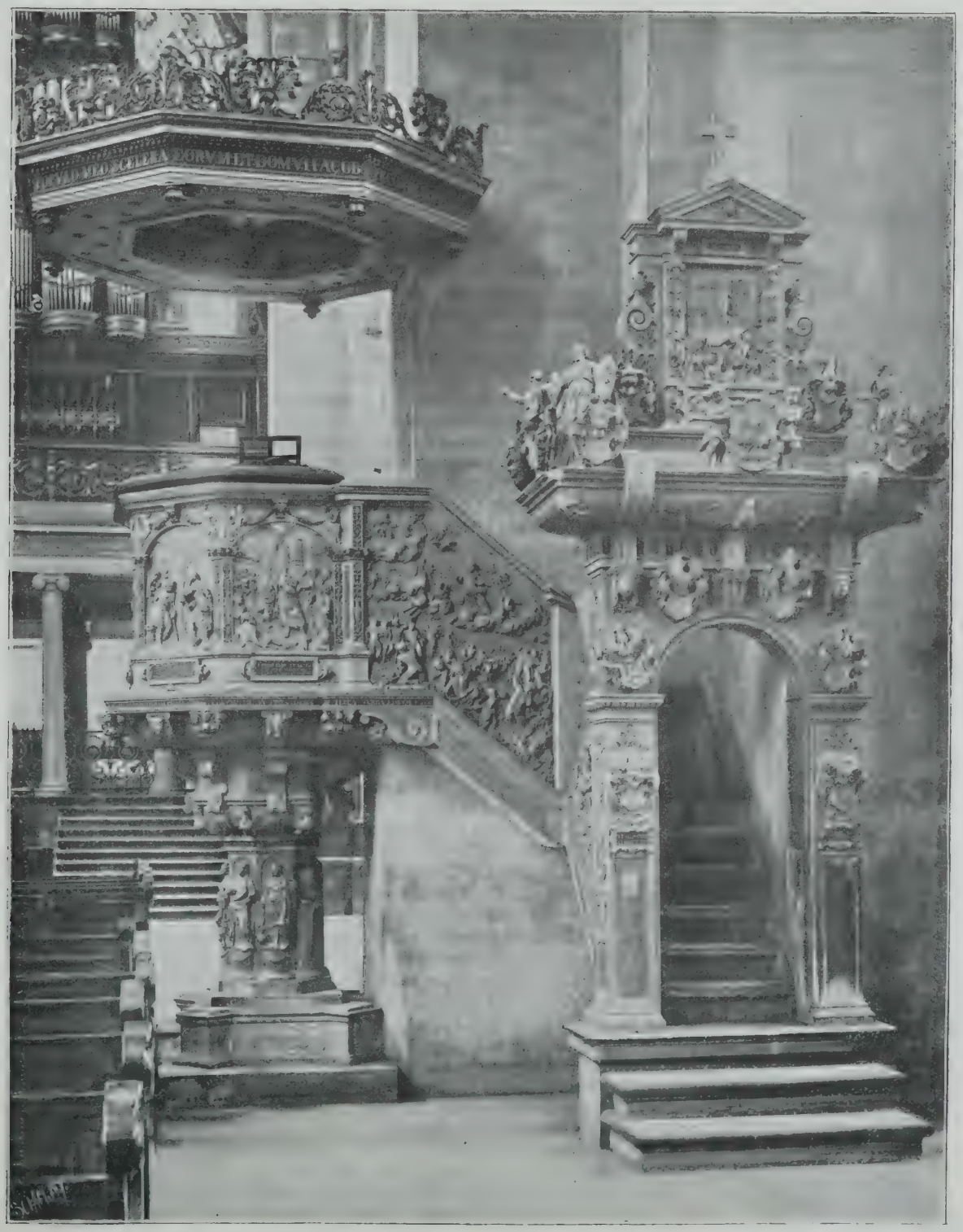

THE PULPIT OF THE CATHEDRAL OF TREVES.—See page 34.

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No. 361 BROADWAY, NEW YORK.

NEW YORK, AUGUST, 1897.

THE

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BUILDING EDITION.

ESTABLISHED 1885.

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SCIENTIFIC AMERICAN, BUILDING EDITION.

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MODERN FIREPROOF CONSTRUCTION UNDER TEST.

The destructive fire which recently occurred in Pittsburg, Pa., affords a valuable object-lesson for every one who is interested in the subject of fireproof construction. Of the five buildings which were burned, the one which has aroused the greatest interest among engineers and architects is a six-story building of skeleton construction, which is known as the Horne Department Store. The steel columns of the walls were provided with 9 inches of brick protection on the lower floors, and with 4½ inches protection on the floors above. Protection was also afforded by the paneling, which was carried by twin 24-inch, 80 pound I beams. The interior columns were provided with a 2-inch air space and 2-inch hollow tile protection. The floors were of 8-inch, tile, flat arch construction, and were carried on 12-inch, 32 pound I beams, spaced 4 feet 6 inches, centre to centre. The floor beams and girders were protected by tiling in the customary manner. There was a well hole, measuring 22 feet x 48 feet, running from the first floor to the roof, where it was lighted with a stout glass skylight carried on steel trusses. The building was provided with four open elevators and a main stairway.

The manner in which the Horne building caught fire calls to mind the great Bleecker Street fire in New York. In the present case the fire originated in a building filled with inflammable material, which stood on the opposite side of the street. The fierce heat of the fire broke the windows of the Horne building, and set fire to the goods on all of the floors simultaneously, in much the same way as the fire was started in the Manhattan Savings Institution in the Bleecker Street disaster.

Everything that could burn in the Horne building was reduced to ashes, and considering the large amount of combustible material that was found on every floor, the heat of the fire must have been extraordinarily fierce. Nevertheless, the steel skeleton and the fireproof flooring stood the test remarkably well, the former being practically intact, and the latter remaining in place throughout the greater part of the building. There was no such sagging of the floors and bending of the main girders as occurred in the Bleecker Street fire, where the lower half of the main girders was entirely without fireproof protection. In the Horne building the tile protection extended beneath and entirely covered in the bottom flanges of all steel work. The consequence is, that the steel framework of the building is all available for future use, and it will only be necessary to repair the fireproofing of the walls and relay the arch floors where they have cracked or broken through.

The worst damage that was done to the building was occasioned by the fall of a large tank which was carried upon the roof on timber supports. When the supports were burned through, the tank went crashing through the floors, carrying away girders and columns in its fall. It may be remarked in this connection that roof tanks are responsible for the destruction of many a house which, but for their presence, might be saved. The tank almost invariably falls through the building, and by breaking a huge hole through every floor, makes a vent by which the fire is drawn up through the structure. If a tank is put upon the roof it should be carried securely upon steel girders attached to the steel framework of the building; to place it upon a wooden trestle or upon wooden joists, as is frequently done, is to invite disaster.

The first glance at the burned buildings might suggest that the fireproofing was not worthy of the name; but it must be borne in mind that the term fireproof is only used in a relative sense. The value of the present system is seen in the fact that the structural steel skeleton of the building is practically intact. The injured tiling and brickwork can be replaced, the wooden flooring relaid, and fresh partitioning, doors, windows, etc., can be inserted; in other words, the costly frame and walls have remained practically intact under circumstances which would have razed a non-fireproof building to the ground. The standard system of fireproofing is capable of confining a fire to a particular floor, provided the floors do not open on to a common shaft; but it is powerless to resist an attack on every floor such as in this case occurred from a very fierce fire burning in close proximity. When the side of a fireproof building nearest to a conflagration is composed largely of glass, the windows occupying the whole of the space between the piers or columns, its contents are certain to be ignited. As the tendency in the later business blocks is to increase the window space at the expense of wall space, it is evident that they cannot possibly be made fireproof in the sense of being able to resist attack from the outside. The most that can be done is to localize the fire as far as possible, and give the structure such a measure of fire-resisting qualities as shall enable it to be repaired at the least expense of time and money. The results of the Pittsburg fire show that the fireproofing as carried out in the burned buildings was able to insure their stability as far as their structural strength was concerned, and had it not been for the fall of the tank in the Horne building it is certain that the skeleton frame would have been in good condition after the ordeal.

This fire, like every other that has occurred in fireproof structures, shows the wisdom of rigidly excluding wood construction wherever it is possible to dispense with it. It is understood, of course, that there are buildings put up for certain purposes where a certain amount of wooden fixtures may be a necessity; but in the great majority of city business blocks it would be possible to substitute metal for wood in the construction of window frames and sashes, doors, wainscoting, and to a large extent in the office and store furniture. When this is done in the thorough manner which characterizes the Congressional Library at Washington or the Boston Public Library, fireproofing will be as absolutely perfect as our present knowledge of the art can make it.

A RESIDENCE AND STABLE AT LARCHMONT, NEW YORK.

We present herewith in this issue, on pages 26 and 27, a residence and stable which have been erected for Henry A. Van Liew, Esq., at Larchmont, New York. The design for the residence presents a very striking appearance, and it is treated in a pleasing style of architecture, with many excellent features, including a spacious piazza and porte-cochère, bay windows, tower, and chimneys, which are a feature in themselves. The underpinning is built of native granite, of a creamy gray color, with faces left rough as they come from the quarry. The columns and balustrade at front and chimneys are built of a similar stone. The superstructure is constructed of wood, and the exterior framework is covered with shingles, and left to weather finish a natural silvery gray color. The trimmings and blinds are painted light yellow. The roof is shingled and finished natural. Dimensions: Front, 63 ft. 6 in.; side, 38 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 9 ft. The cellar contains kitchen, laundry, pantries, furnace room, and other necessary apartments, all finished up in a most complete manner. The interior is trimmed with hardwood and finished natural. The vestibule and main hall, broad and spacious, are provided with paneled wainscoting and ceiling beams. The staircase is an ornamental one, with the newel posts formed of a cluster of spindle balusters, and it is well lighted by three large stained glass windows, shedding a soft and pleasant light over both upper and lower halls. The parlor and library are separated by a chimney breast, on either side of which are sprung circular arches, provided with spindle transoms. The parlor is treated in cream white, and the fireplace has a ivory white tiled hearth and facings and a mantel of exquisite design. The library has bookcases built in, window seats, and a fireplace, with tiled trimmings and mantel. The dining-room is a large, well lighted apartment, and it contains nook with buffet built in, and an open fireplace built of brick, with facings and hearth of same, and mantel. The billiard-room has a similar fireplace, and the toilet-room is fitted up with the best modern fixtures. The butler's pantry is furnished with sink, dresser, cupboards and dumb-waiter, and stairway to kitchen and to second floor. The second floor contains five bedrooms, large closets and bathroom. The open fireplaces are trimmed with tiles and furnished with neat ornamental mantels. The bath-room is paved with tiles and wainscoted with Italian marble, and is furnished with porcelain fixtures and exposed nickelplated plumbing. The spray bath has a wainscoting and floor of similar marble and tiles, and is fitted up in the best possible manner. The third floor contains four bedrooms and ample storage. The stable is unusually fine in its lines and design. The main stable, with its two wings forming an open court, is an excellent feature. The foundation is built of rock-faced stone, while the superstructure is sheathed on the exterior and covered with shingles, and left to finish a natural silver gray color, while the trimmings are painted cream white. The roof is shingled and finished similar. Dimensions: Front, 52 ft.; side, 45 ft. The interior throughout is ceiled up with narrow beaded yellow pine, and finished with hard oil. The open court contains carriage wash with drain connection. The carriage-room, 23 x 40, furnishes ample room for carriages. The harness-room is fitted up with harness cases, with sliding glass doors and the usual iron fixtures. The two box stalls and the four other stalls are well lighted and ventilated, and are furnished with the usual ornamental iron fixtures. The second floor contains the coachman's apartment, consisting of three rooms, besides ample storage for feed and hay. Mr. H. C. Stone, architect, 72 West Seventy-first street, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

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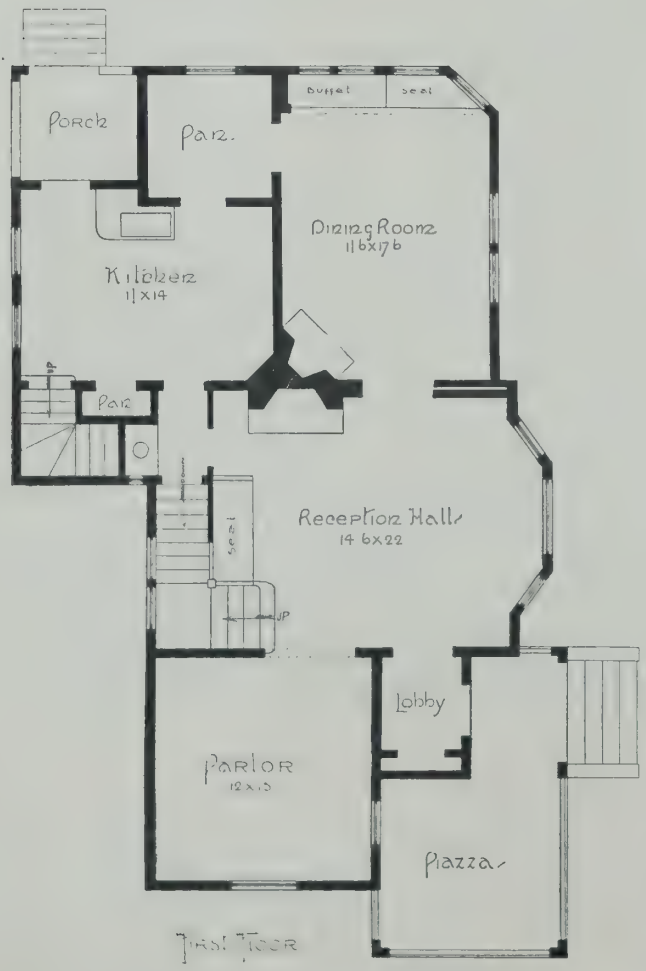
THE WASHINGTON MONUMENT, PHILADELPHIA.

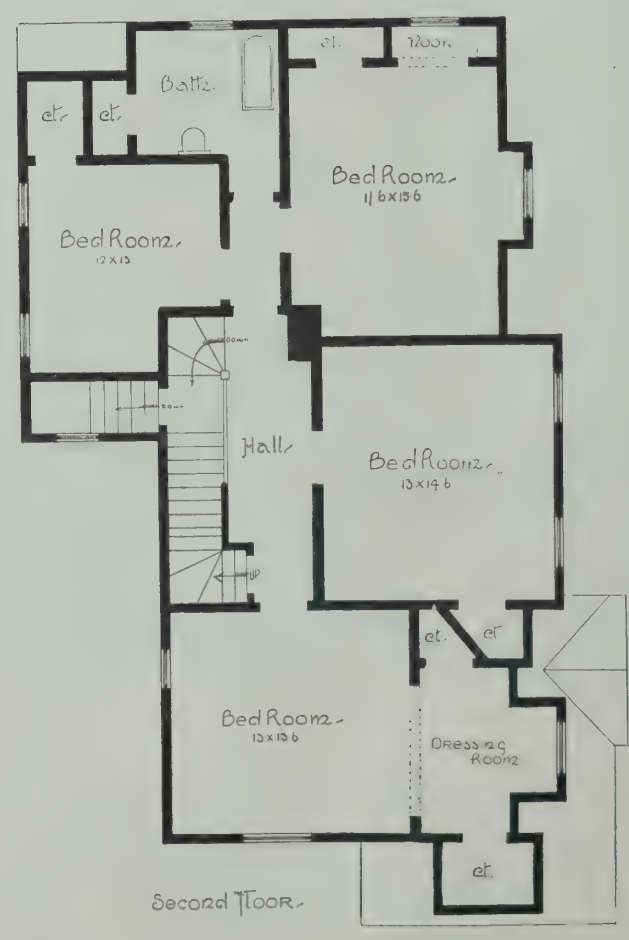
The new Washington monument, erected at the Green Street entrance of Fairmount Park, Philadelphia, which was presented to the city by the State Society of the Cincinnati, was unveiled on May 15 by President McKinley in the presence of thousands of spectators. The statue is one of the most important and imposing monuments ever erected in the United States. In 1783 the officers of the revolutionary war, wishing to perpetuate their friendship and raise a fund for relieving the widows and orphans, organized the Society of the Cincinnati. In 1810 they began to raise a fund of $150,000 to build a monument to George Washington, but owing to the troublous times following the war of 1812 this movement was stopped temporarily. When Lafayette visited Philadelphia in 1824, the absence of any monument caused some adverse criticism, and a new fund was started which was soon forgotten, but was revived in 1832 on the one hundredth anniversary of Washington's birth. The fund of 1810 had in 1880 grown to $137,000, and the funds of 1824 and 1832 had grown into $50,000. The union of these funds, together with their further increase by investment and donation, was sufficient to pay for the splendid memorial which has just been unveiled, which cost in all $250,000. The design was made by the German sculptor, Rudolph Siemering, and represents an equestrian statue of George Washington on an immense pedestal of bronze placed on a granite platform or base. The figures and ornaments are all in bronze, and the monument as it now stands is forty-four feet high. The base of the monument is oblong in shape, 61 x 74 feet, and is built of pink Swedish granite, having thirteen steps, symbolical of the thirteen original States. At the corners are fountains representing four great American rivers, the Delaware, Hudson, Potomac, and Mississippi, with allegorical figures of Indians. These fountains are guarded on either side by native animals, all in bronze. From the platform rises a granite and bronze pedestal, some seventeen feet high, while, as a crown, is a bronze equestrian statue of General Washington in the uniform of the revolutionary army. A large military cloak is thrown over his shoulders, falling well over the horse. At the front of the pedestal is an allegorical group representing America, seated, holding a trident and cornucopia. On either side is a figure, one holding a scroll, the other offering a wreath; below is an American eagle supporting the arms of the United States.

THE WASHINGTON MONUMENT, PHILADELPHIA.

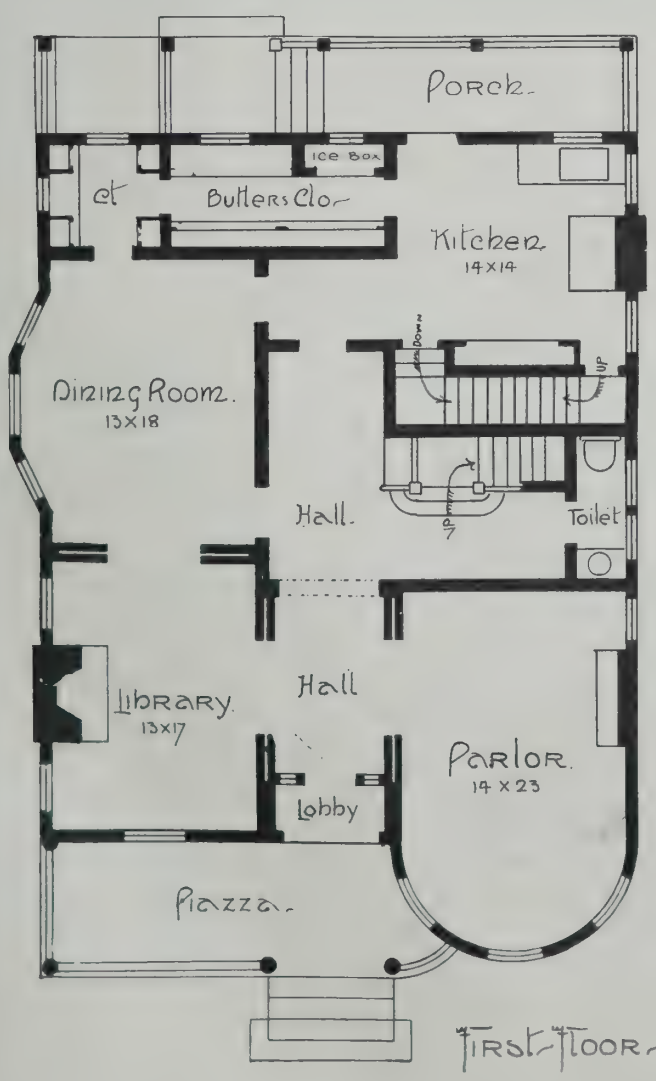
The group at the back is America showing her sons their condition of slavery, at the same time urging them to go forth and seek freedom and independence. Beneath this group are the arms of Pennsylvania. Bronze bas-reliefs are on either side of the pedestals, one representing the march of an army, and the other that of a west bound emigrant train. Immediately under the statue and running around the pedestal are the words, "Erected by the State Society of the Cincinnati of Pennsylvania."

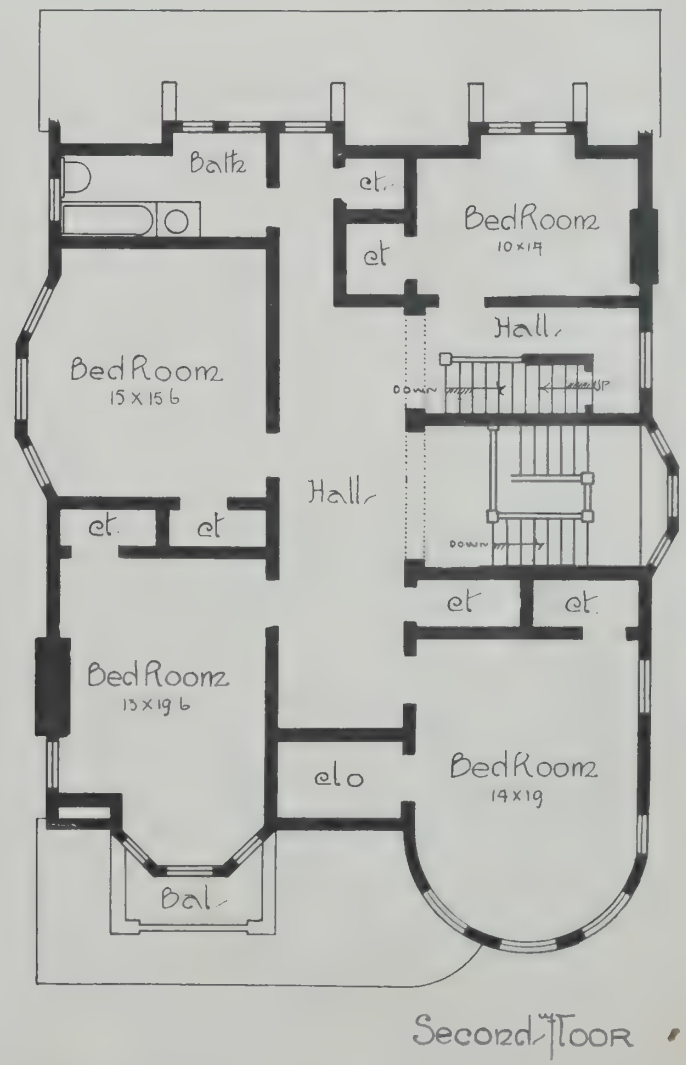
(*Continued on page 34.*)





A COTTAGE AT BINGHAMTON, N. Y.—See page 34.

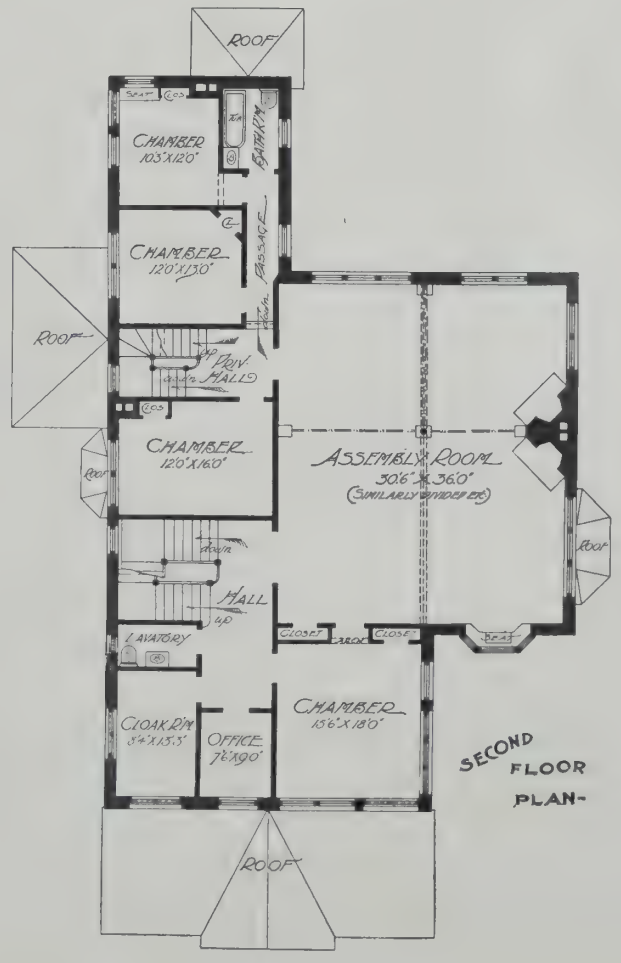




A COTTAGE AT SCRANTON, PA.—See page 35.

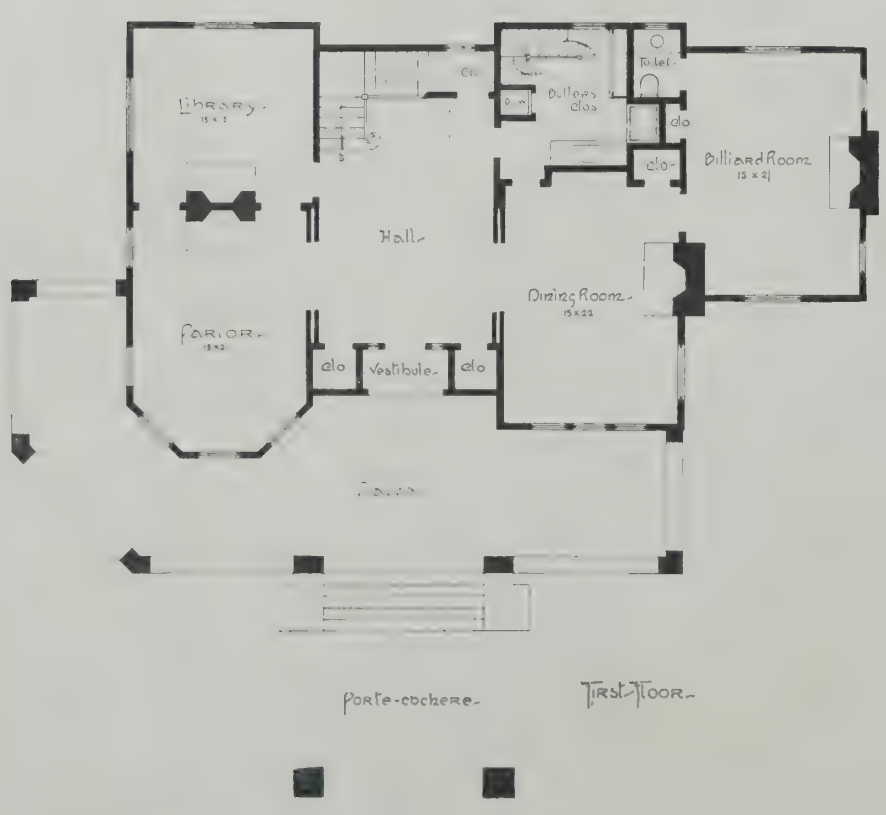
A MODERN RESIDENCE AT PROHIBITION PARK, STATEN ISLAND.—See page 35.

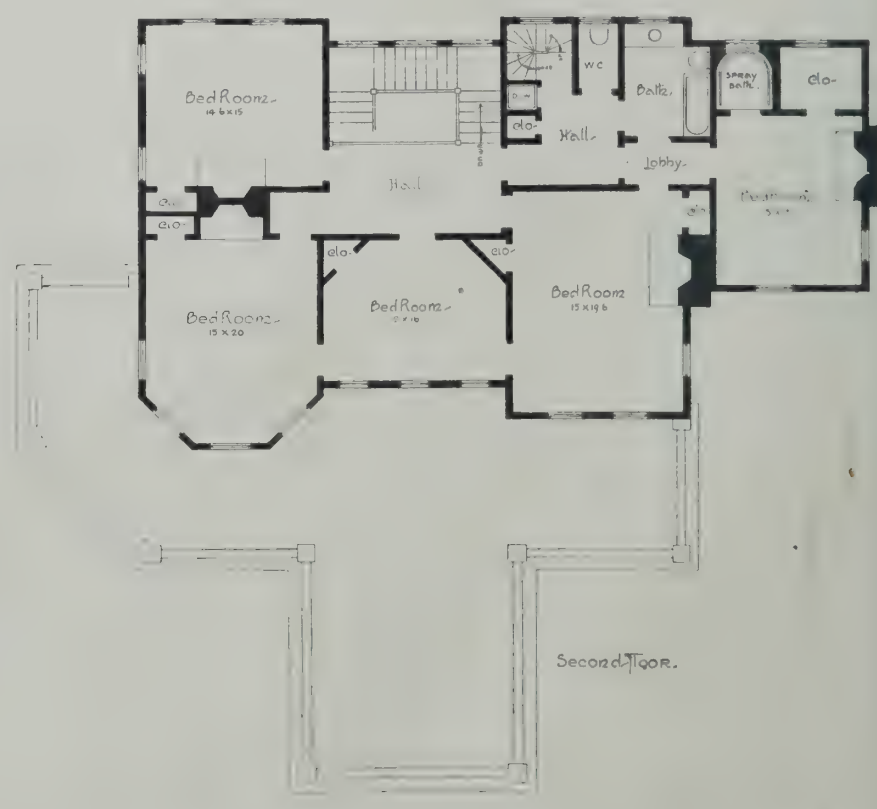
FIRST FLOOR PLAN



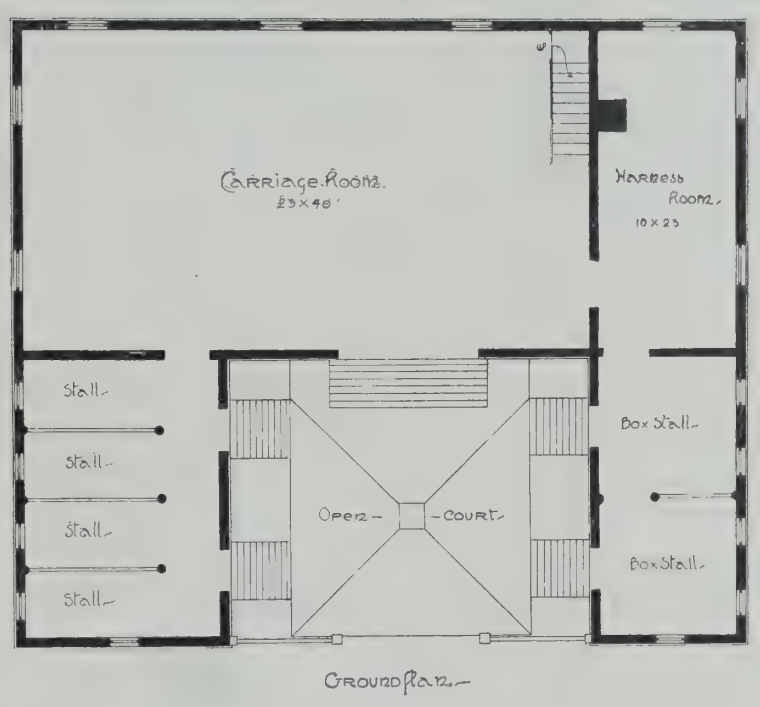
SECOND FLOOR PLAN

A SUBURBAN SCHOOLHOUSE AT OVERBROOK, PA.—See page 35.



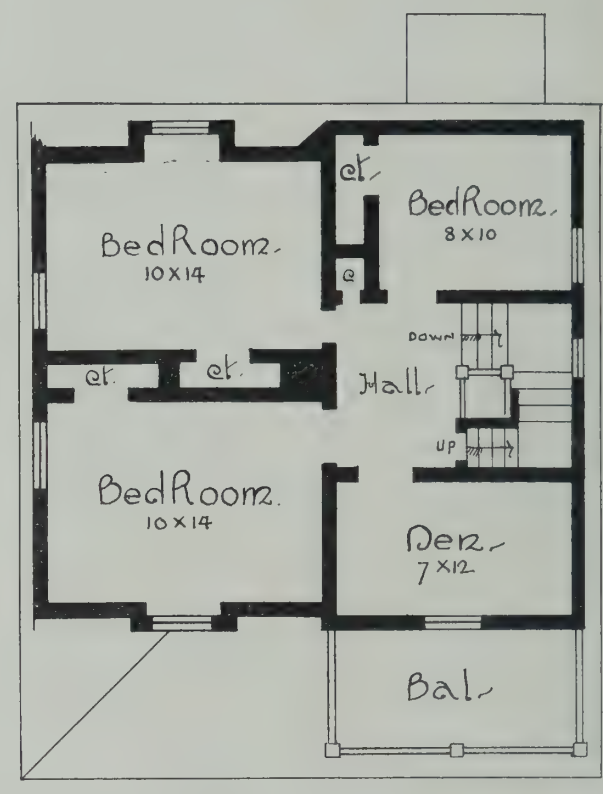


A RESIDENCE AND STABLE AT LARCHMONT, N. Y.—See page 20.

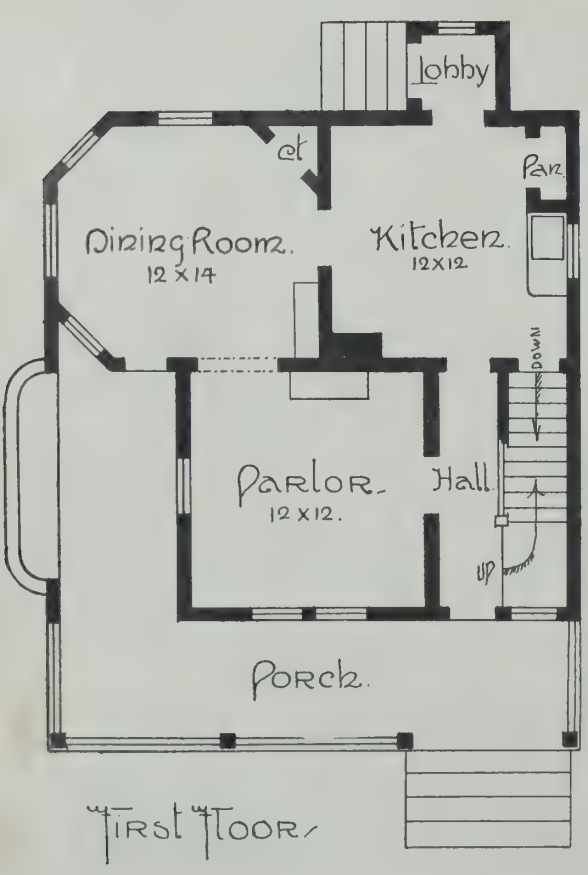


Ground Plan.

A RESIDENCE AND STABLE AT LARCHMONT, N. Y.—See page 20.

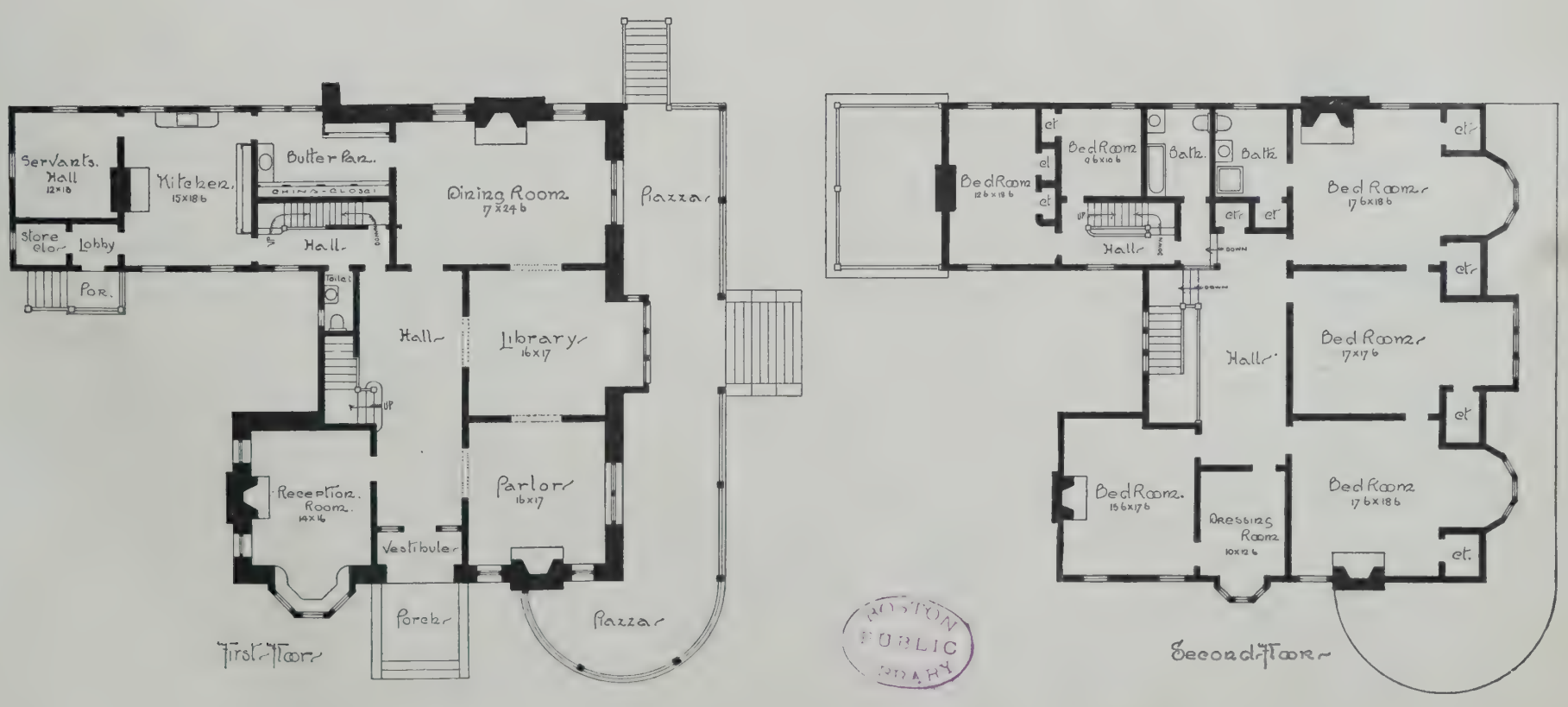


Second Floor.



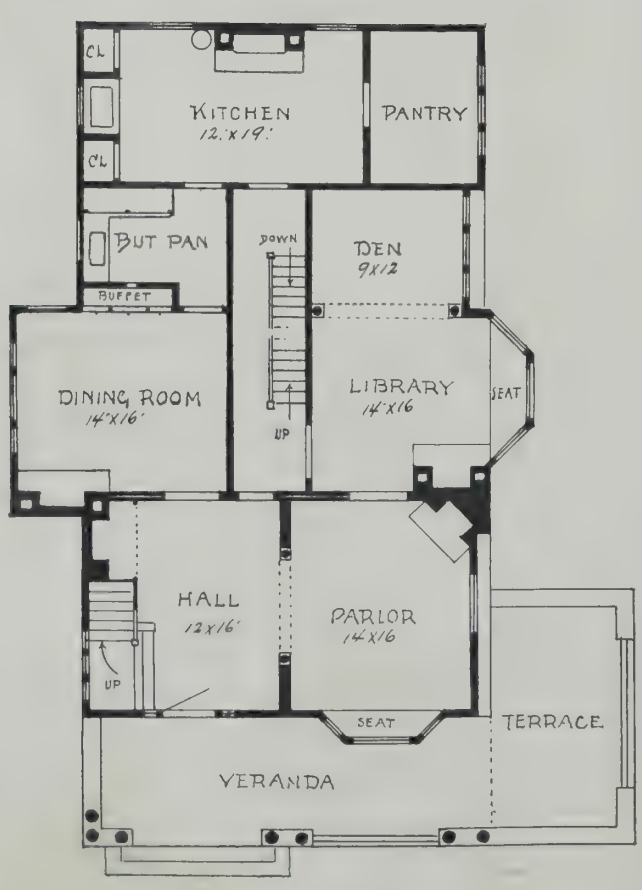
First Floor.

A COTTAGE AT CLINTON TOWNSHIP, N. J.—See page 34.

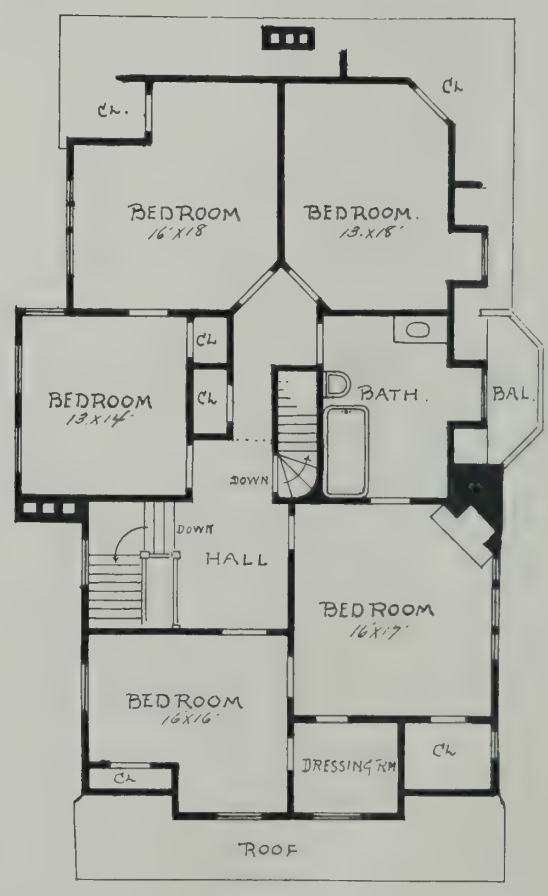


BOSTON PUBLIC LIBRARY

A RESIDENCE AT LARCHMONT, N. Y See page 34.

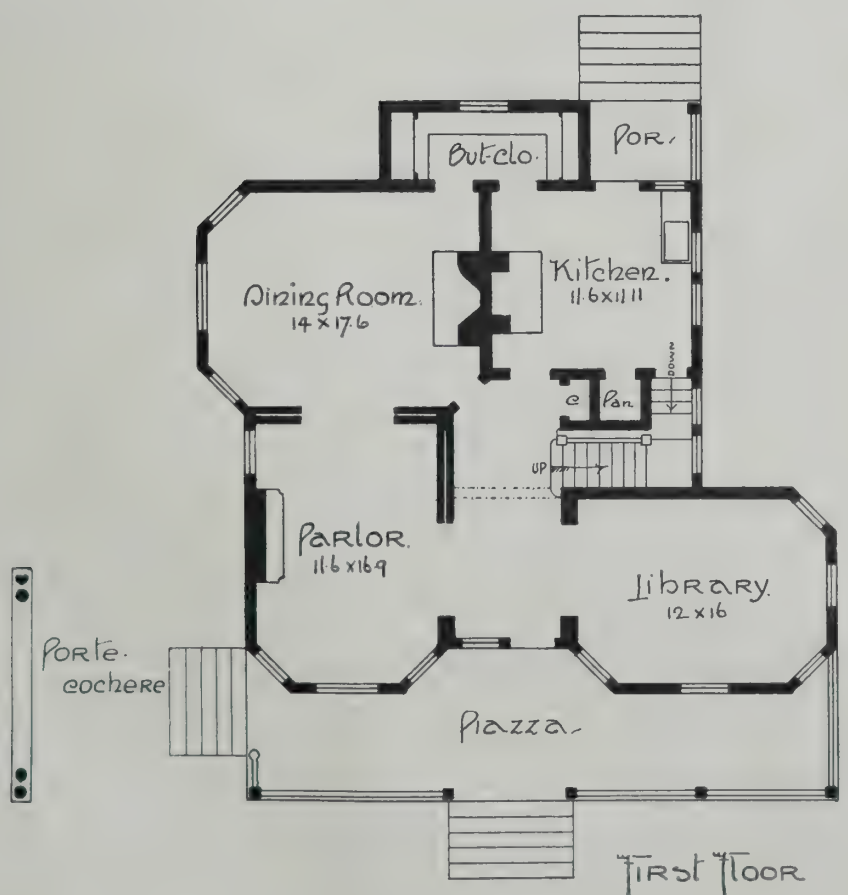


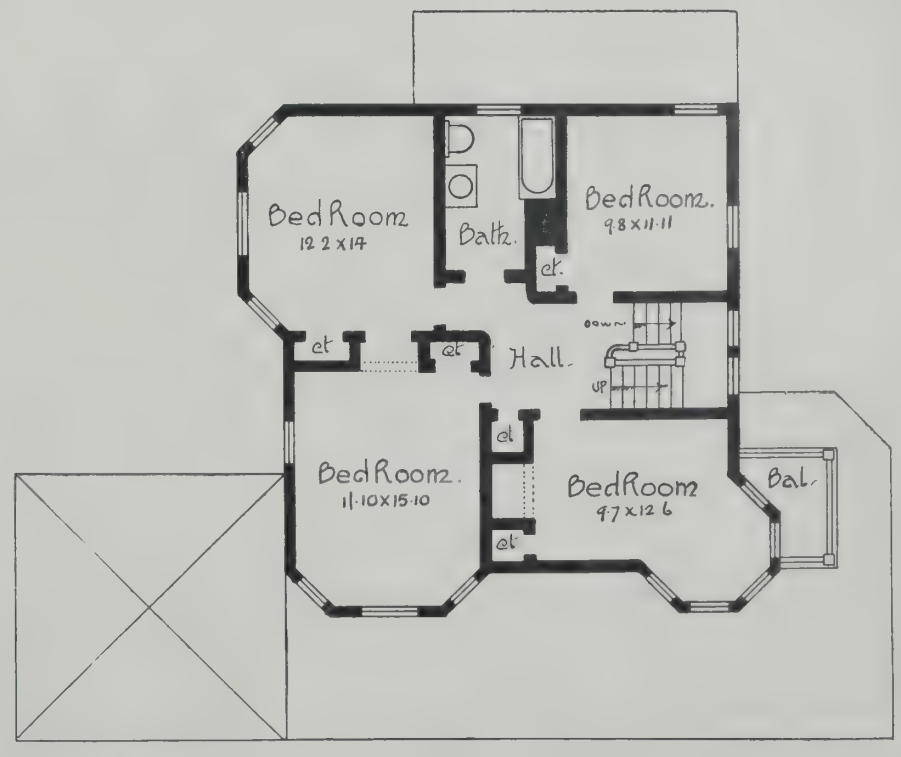
First Floor.



Second Floor.

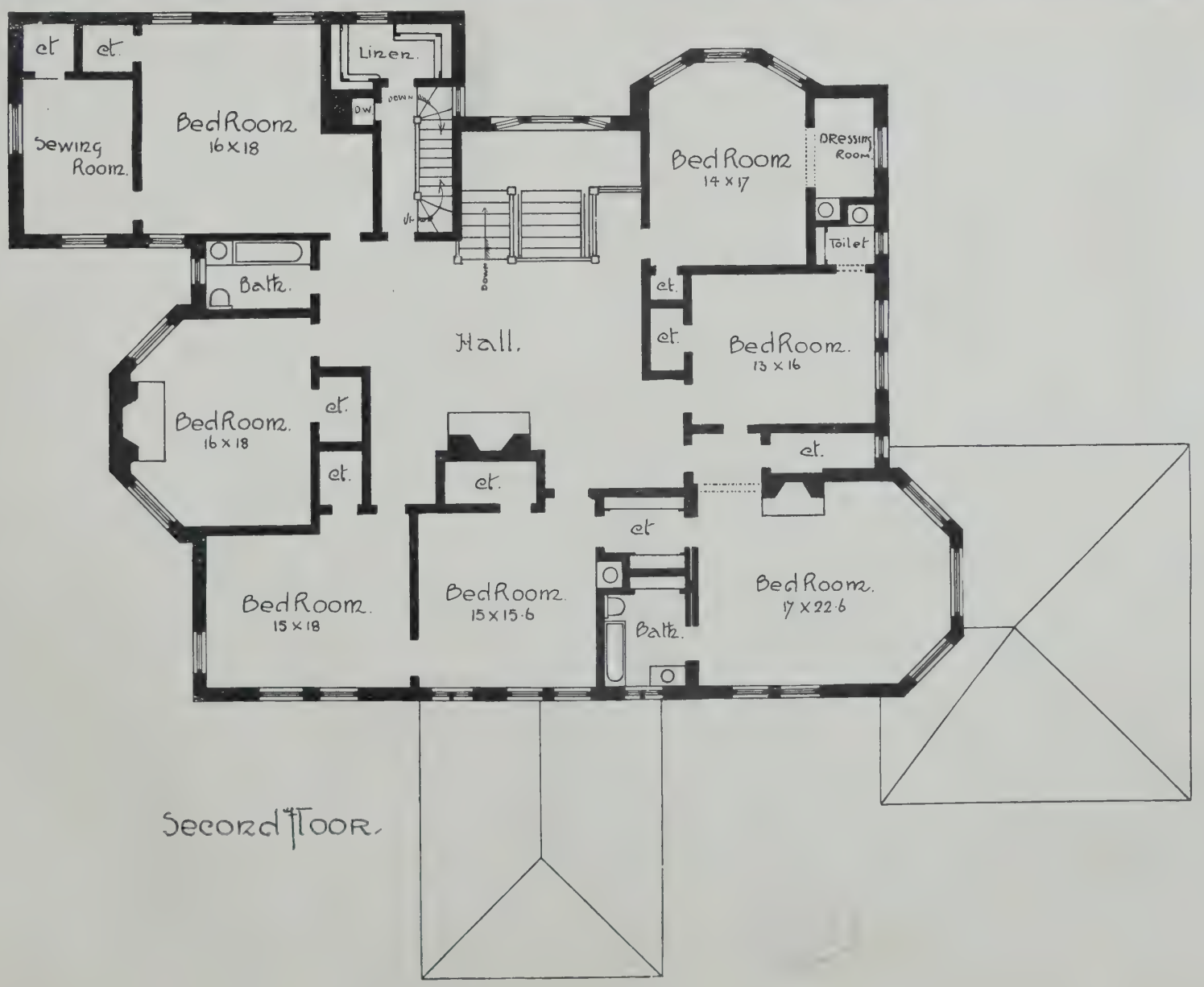
A RESIDENCE AT PRINCES BAY, STATEN ISLAND.—See page 34.





A COTTAGE AT FOREST HILL, NEWARK, N. J.—See page 35.

A RESIDENCE AT EVANSTON, ILL.—See page 34.



A RESIDENCE AT EVANSTON, ILL.—See page 34.

(*Continued from page 21.*)

The unveiling ceremonies were most imposing. The first event of the day was firing the salute at sunrise by the batteries of the United States regulars camping in Fairmount Park. A committee of the Military Order of Foreign Wars called on the President and presented to him the insignia of the society. After a drive through the park and city the President returned to the Hotel Walton for luncheon. In the mean time the parade was forming. The parade passed through the principal streets, the President being escorted to the scene of the unveiling ceremonies by the City Troop.

The ceremonies at the monument began at two o'clock with prayer by Bishop Whittaker, of Pennsylvania. An address by Major Wayne, President of the State and General Societies of the Cincinnati, followed. The President then unveiled the figure of Washington. This was the signal for the firing of the national salute by the war vessels in the Delaware. President McKinley then made a short but excellent speech.

Our engraving is reproduced from an excellent photograph by W. H. Rau, of Philadelphia.

A COTTAGE AT BINGHAMTON, N. Y.

We present as a subject for colors on the cover of this issue, and also on page 22, a cottage, which has been erected for Mrs. Bartoo, at Binghamton, N. Y. The design is of the English style, half timber work, and is very attractive in its treatment of the elevations. The plans are unusually well arranged, and the interior is treated and finished in a very handsome manner. The underpinning is built of red sandstone. The first story is clapboarded on the exterior, and painted olive green with bottle green trimmings. The second and third stories are shingled and painted a reddish brown, of a warm tone in color, while the half-timbered work is painted bottle green, with the spaces between filled in with plaster work. The roof is shingled and painted Indian red. The vestibule and hall are cased in oak with oak floors. The hall has a paneled wainscoting four feet six inches in height, a seat upholstered in leather, and an open fireplace with dull red tile trimmings, and a mantel of exquisite design. The staircase is inclosed with an ornamental screen of turned balusters and columns with carved caps. The general treatment of this hall is Early English, and the oak is stained a warm brown color. The parlor is treated with white enamel in a dainty manner, and it opens from hall by an archway with spindle transom. The walls of this room are treated in robin's-egg blue, with a two-foot frieze of deep cream, with a delicate blue flower embossed, and gilt line figures. The dining-room is in cypress, with yellow pine floor, and the walls are treated in a dark red, with frieze and ceiling of a lighter shade. A buffet and seat are built in at one end of room in an artistic manner, while in the opposite corner is an open fireplace with tiled trimmings and mantel. The butler's pantry is trimmed with cypress, with paneled doors to all cupboards. The kitchen and pantries are trimmed and wainscoted with yellow pine, and are furnished replete. The second story is painted in ivory white, with the exception of one bedroom and hall, which are finished in natural pine. This floor contains four bedrooms, large closets, and bathroom, the latter wainscoted with yellow pine, and fitted up with porcelain fixtures and exposed plumbing. The third floor contains one bedroom and ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $3,500 complete. Mr. Elfred Bartoo, architect, Binghamton, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A RESIDENCE AT LARCHMONT, N. Y.

We present in this issue, on page 29, a residence recently completed for Miss Flint, at Larchmont, N. Y. The design presents a good, modern, sensible house, with elevations, treated with Colonial detail, and sufficiently ornamented to give a pleasing and substantial appearance, and it has also a well lined roof falling gracefully down and forming a cover to the spacious piazza. The underpinning and the main part of first story are built of rock-faced granite of a bluish color. The kitchen extension and second floor are built of wood, and the exterior framework is covered with shingles and left to weather finish, while the trimmings are painted bottle green. The roof is shingled and finished natural. Dimensions: Front, 75 ft.; side, 60 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in; first story, 10 ft.; second, 9 ft. 6 in.; third, 8 ft. 6 in. The entrance vestibule is furnished with a tiled floor, a paneled wainscoting and a beamed ceiling. The main hall is a long central one with a staircase at one side. It is trimmed with quartered oak and is wainscoted in panels. The staircase is an ornamental one with massive newel posts, balusters and rail, and is lighted with a cluster of stained glass windows with excellent effect. The reception room is trimmed with cherry, and it contains a bay window with a paneled divan, and an open fireplace trimmed with tiled hearth and facings and a mantel of special design. Parlor is trimmed with pine and is treated with white and gold, and library is trimmed with cherry; the former is provided with an open fireplace treated with tiled trimmings and a mantel finished to correspond with the trim of the apartment. Library is provided with a bay window and openings running down to floor so as to give access to piazza. Dining-room is a spacious apartment and is trimmed with oak. It is provided with a paneled wainscoting and ceiling beams, and an open fireplace trimmed with tiled hearth and facings and mantel elegantly carved. The hall and all rooms on first floor are connected by square archways and furnished with curtains. The floors are of oak laid in narrow widths. The rear staircase and hall are conveniently located and form the means by which the kitchen is isolated from the remainder of the house. This stairway is of ornamental design and is turned out of ash. The toilet is fitted up complete. This hall, kitchen, servants' dining-hall, store closet, lobby and pantries are trimmed and wainscoted with whitewood and finished natural, and they are fitted up with the best modern conveniences. The second floor is trimmed with white pine and contains a large open hall, four bedrooms, dressing-room, bath and private bath, and two servants' bedrooms, besides ample closets. Bathrooms are paved and wainscoted with white English tiling and furnished with porcelain fixtures and exposed plumbing. Third floor contains six bedrooms and ample storage. Cemented cellar contains furnace, laundry, and other necessary fixtures and apartments. Messrs. G. E. Harney and W. S. Purdy, architects, 71 Broadway, New York.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A RESIDENCE AT PRINCES BAY, STATEN ISLAND.

The engravings presented on page 30 illustrate a residence recently erected for A. W. Browne, Esq., at Princes Bay, Staten Island. The illustrations present a rustic design of much artistic merit, which harmonizes nicely with its appropriate surroundings. Its rustic effect is heightened by the use of large field-stones in their moss-covered state in the construction of the basement walls. The grade from front to rear is of such steep descent that the basement is practically a full story. The original feature of the design is the driveway, or porte-cochère, entrance, running through the building, with a broad, low archway at either side. A handsomely finished basement, hall and stairway lead from this entrance to the main hall of first story above. Massive sliding doors are provided to close each archway of porte-cochère when the inclemency of the weather makes it desirable. The building is low and rambling, Colonial in its character and coloring, and constructed of frame above the line of stonework, the first or main story being clapboarded, elsewhere shingled. From a spacious veranda one enters the "reception hall," with its broad, easy staircase, and mantel nook or arched recess. The hall is handsomely finished in oak; the communication between this apartment and parlor by wide opening, with columns at either side, is an attractive feature—the same treatment being repeated between the library and den. The several rooms of the first story are so arranged and thrown together that their varying decorations and furnishing permit of a most harmonious and pleasing contrast. The parlor is finished in cream enamel, the dining-room in Flemish oak, the library and den in mahogany. An artistic feature is introduced in each room in the way of tiled mantel, or window seat, with leaded glass introduced in places to assist in the effect. The large, well-lighted kitchen and the liberal pantry accommodation are desirable features of this plan. Back stairs lead to second story, consisting of five good bedrooms and large bathroom, which contains the best of open-set sanitary plumbing. The woodwork of the entire second story is painted in delicate-tinted colors. The interior arrangement could readily be modified or changed to suit individual tastes or requirements, without changing the general character of the design. The attic is left unfinished, but several good rooms could be provided if desired. Approximate cost, $8,000. A house could be erected similar to this one from $5,000 to $8,000, the cost depending upon the quality of materials entering into its construction, and the accessibility of locality. Mr. F. W. Beall, architect, 58 West Fifty-seventh Street, New York.

Our engraving was made direct from a photograph of the building, taken especially for the Scientific American.

A RESIDENCE AT EVANSTON, ILL.

On pages 32 and 33 will be found engravings and floor plans of a residence erected for C. B. Congdon, Esq., at Evanston, Ill. The engravings present a very substantial building of a dignified character, and its lines are broken sufficiently to give it an attractive appearance. It is constructed of the best materials and in a thorough workmanlike manner. The exterior walls are built of a local granite in a silver-gray tint, and is quite in harmony with the blue-slated roof and the general surroundings. Dimensions: Front, 82 ft; side, 61 ft., not including piazza and porte-cochère. Height of ceilings: Cellar, 8 ft.; first story, 11 ft.; second, 10 ft.; third, 9 ft. The vestibule and hall are trimmed with quartered oak. The walls have paneled wainscoting, and the ceiling is beamed. The alcove at the left of vestibule is a pleasing feature, and is provided with seats and a spindle transom at archway. The grand open staircase, with its massive columns rising to ceiling and forming a colonnade effect, and its newel posts formed of a cluster of spindle balusters, is one of the most artistic features. The parlor is treated in old ivory white and gold. Library and music-room are trimmed with quartered sycamore, the former containing bookcases built in and a paneled divan. Billiard-room is trimmed with antique oak, and contains an alcove, with beamed arch and open fireplace. Dining-room is trimmed with cherry, and it has a paneled wainscoting and a beamed ceiling. The arcaded effect formed by columns extending to ceiling and separating the bay window and fireplace adds much beauty to the already handsomely trimmed apartment. The fireplaces are elegantly furnished with hearths and facings of African marble and mantels made from special designs, and to correspond with the trim of each apartment respectively. The floors are laid with hardwood and highly polished. Butler's pantry, kitchen, and servants' dining-room are wainscoted with narrow beaded stuff, and are fitted up with the best modern improvements complete. The second floor is trimmed with red and white birch, and it contains a large open hall, seven bedrooms, sewing-room, twelve closets, and two bathrooms. The fireplace in main hall and bedrooms have tiled hearths and facings, and mantels of good design. Each bedroom is provided with a stationary lavatory. The bathrooms are fitted up with tiled walls and floors, porcelain fixtures, and exposed plumbing. Third floor contains three bedrooms trunk room, and bathroom. Cemented cellar contains furnace, laundry, drying-room, milkroom, vegetable cellar, and other necessary apartments. Messrs. A. M. F. Colton & Son, architects, No. 70 Clark Street, Chicago, Ill.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A COTTAGE AT CLINTON TOWNSHIP, N. J.

We present herewith in this issue, on page 28, a cottage of modern treatment, which has been recently erected for the Protective Building and Loan Association, at Clinton Township, N. J. The engravings present a house designed in good style, with a gambrel roof and a spacious piazza combined with a most excellent plan. The underpinning is built of brick. The first story is covered with clapboards and painted an olive green with white trimmings. The second and third stories are covered with shingles and painted light yellow. The roof is also shingled and left to finish natural. Dimensions: Front, 27 ft. 6 in.; side, 25 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft; second, 8 ft. The interior is trimmed throughout with white pine and finished natural. The hall contains an ornamental stairway with turned post, rail and balusters. The parlor and dining-room are separated by folding doors and each have neat wood mantels. The kitchen is conveniently arranged and it contains pantry, sink, lobby, and stairs to cellar complete. The second floor contains den, closets, and three bedrooms. The den could be fitted into a bathroom if desired. The attic contains ample storage. Cemented cellar contains washroom and ample space for the necessary apartments. Cost $1,500 complete. Messrs. Hobbs Bros., architects, Newark, N. J.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

THE PULPIT OF THE CATHEDRAL OF TREVES.

Of all the countless thousands of tourists who rush up and down the Rhine on the steamers, probably not one per cent ever visit the old city of Trèves, or Trier, as it is called in Germany, though it is one of the most interesting places in the empire. Trèves is situated on the right bank of the Moselle, and can be reached from Coblence by rail or by the river Moselle. A tribe of Belgic Gauls who occupied the territory were conquered by Cæsar, in B. C. 56. In the reign of Diocletian, Trèves became the capital of Belgica Prima, and during the fourth century it was frequently the residence of the Roman emperors. After the introduction of Christianity, the old Roman city became the residence of bishops, archbishops, and electors, until Clemens Wenceslaus, the last elector, transferred his residence to Coblence, in 1786, and in 1815 it was ceded to Prussia.

The city is picturesquely situated in a rich plain surrounded by vine-clad hills and wooded heights. Several of the Roman structures still remain in very fair preservation. The principal monuments are the Porta Nigra (a fortified city gate), the brick basilica, the Roman palace, the amphitheatre, Roman baths, and the Igel monument, one of the most interesting Roman relics north of the Alps. Even the cathedral itself derives from the Romans. It is one of the oldest churches in Germany, the nucleus consisting of a quadrangular basilica erected by the Emperor Valentinian I. (364-375) for commercial purposes and the administration of justice. The church, which was made out of the basilica, was partially destroyed by the Franks, but was restored in the original style some time about 550. It was again devastated by the Normans and was restored and increased in size about 1035. The vaulting of the nave and aisles dates from the thirteenth century. The

interior contains several monuments worthy of note, and in the high altar is the "Holy Coat" without seam, which is exhibited at rare intervals. This is one of the most famous, if not the most famous, of relics.

One of the best bits of detail in the building is the pulpit shown on our first page, dating from 1572. It was the work of Hans Ruprecht Hoffman. The pulpit is approached by an imposing staircase whose entrance is masked by a doorway. This doorway is heavily overlaid with ornaments, though, fortunately, of a good period. The armorial bearings are effectively introduced. The pulpit proper rests on an octagonal column, the facets of the column having small engaged statues. The reliefs on the pulpit are quite high, and are well up to the best German work of the period, though they are hardly as pure as the Italian work of the period which had preceded it. A carved canopy completes what is perhaps one of the finest pulpits north of the Alps. For our engraving we are indebted to the *Blätter für Architektur und Kunsthandwerk*.

A COTTAGE AT FOREST HILL, NEWARK, N. J.

We present herewith in this issue, on page 31, a cottage recently completed for Mr. Charles W. Clayton, at Forest Hill, Newark, New Jersey. The underpinning is built of red brick laid up in red mortar. The exterior framework is covered with clapboards and shingles. The clapboards are painted colonial yellow, with white trimmings, while the shingles are stained a reddish brown. The roof is shingled also, and stained a moss green with good effect. Dimensions: Front: 41 ft.; side, 28 ft., not including piazza. Height of ceilings: Cellar, 7 ft; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with whitewood and finished natural. The hall, spacious, contains an ornamental staircase turned out of ash. The principal rooms are octagonal in shape, and are well lighted. The library and parlor have false fireplaces, with tiled hearth and facings, and mantels of handsome design. The dining-room has an open fireplace built of brick, with similar trimmings. Kitchen and pantries are wainscoted, and are furnished with the best modern fixtures. The second floor contains four bedrooms, large closets, and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains three bedrooms and ample storage. Cemented cellar contains furnace, laundry and other apartments. Cost, $3,800 complete. Mr. H. Galloway Teneyck, architect, Market and Broad streets, Newark, New Jersey.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT SCRANTON, PA.

We present herewith, on page 23, a modern cottage, which has been recently completed for E. Healy, Esq., at Scranton, Pa. The design is of the modern treatment, with good elevations and well arranged plans. The underpinning is constructed of rock-faced bluestone. The first story is clapboarded and painted a pearl gray, while the second and third stories are covered with shingles, and stained a chromo yellow, with trimmings painted white. The roof is shingled and is stained a moss green. Dimensions: Front, 39 ft.; side, 62 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The hall is trimmed with quartered oak, and it has a paneled wainscoting and ceiling beams. It also has a hardwood floor, paneled seat, and an ornamental staircase, with newel posts and balusters, and a cluster of stained glass windows on second landing. The toilet is located conveniently. The parlor is treated in white and gold, and it has a false fireplace and mantel of excellent design with tiled trimmings. The library is treated in colors and it contains bookcases built in, and an open fireplace, trimmed with tiled hearth and facings, and mantel. Dining-room is trimmed with poplar. It has a bay window thrown out at side, and a large china closet well fitted up. The kitchen and pantries are wainscoted and trimmed with yellow pine finished natural, and each apartment is furnished with the best modern fixtures. The second floor is trimmed with poplar, and is finished natural. This floor contains four bedrooms and bathroom, the latter paved and tiled, and furnished with porcelain fixtures and exposed nickelplated plumbing. There are two bedrooms, and trunk room on third floor. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $7,000 complete. Mr. Edward H. Davis, architect, Commonwealth Building, Scranton, Pa.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A SUBURBAN SCHOOLHOUSE AT OVERBROOK, PA.

We present herewith, on page 25, a suburban schoolhouse, which has been recently erected for the Overbrook Farms Company, at Overbrook, Pa. In planning this schoolhouse a rather difficult problem had to be solved. It had to be designed to resemble a private residence instead of a public building, and it had to combine the necessary school room and the house for teachers, and also in the event of the school being given up at any time, the whole building could be turned into a private dwelling, consequently the design and finish are most superior to the general schoolhouse. The design is exceedingly attractive with its ornamental gables. The first story is built of rock-faced gray stone, with dressed stone lintels and sills. The second and third stories are paneled, and the spaces between being filled in with plaster work and painted a colonial yellow, while the trimmings are painted bottle green. The posts at porch and piazza are of natural hardwood. The roof is covered with shingles, and left to weather finish natural. Dimensions: Front, 55 ft.; side, 75 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft. 6 in.; third, 9 ft. The hall and main rooms are trimmed with oak, and the windows are glazed with plate glass. The walls are painted with a preparation called "Omesco," with a perfectly dull finish, hard and washable. At the left of entrance is a cloakroom conveniently located, and at the right is a classroom, 15 x 18, at the rear of which is the assembly room, 30 x 35, with sliding partitions so that it can be divided into four equal parts when desired. The remainder of this floor is devoted to the main hall, living-room, dining-room, private hall at side porch, and kitchen and its apartments. The second floor contains an assembly room, divided similar to the one on first floor, the principal's office, cloakroom, four chambers, closets, and bathroom. The main hall contains an ornamental staircase, turned out of oak. The fireplaces where shown on plans are built of brick with hearth and facings of tiles, and mantels of oak. The third floor has four classrooms, three bedrooms, and storeroom. Cemented cellar, or basement, contains playroom, gymnasium, furnace room, laundry, and other necessary apartments. Mr. William L. Price, architect, 731 Walnut Street, Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN RESIDENCE AT PROHIBITION PARK, S. I.

We present herewith in this issue, on page 24, a residence recently erected for Mr. J. W. Hoban, at Prohibition Park, S. I. The engravings present a clean cut design of the modern American style with colonial treatment and detail. The lines are sufficiently broken to give it an attractive appearance, and it has many excellent features, including the broad, spacious and well shaded piazza, running across the front of house and returning at corners. The underpinning is built of brick, laid up in a neat manner. The exterior framework is sheathed, papered, and then clapboarded. It is painted colonial yellow with cream white trimmings. The gables are covered with cedar shingles and left to finish natural. The roof is also shingled and finished natural. Dimensions: Front, 36 ft.; side, 40 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The house is trimmed throughout with cypress. The hall contains an ornamental staircase turned out of similar wood, and it has a leaded glass window on first landing. The front door is glazed with plate glass. The parlor has an octagonal bay window, thrown out at side, containing a cypress mantel of excellent design. The library is a square apartment, and it contains an open fireplace built of brick with hearth and facings of tiles and a mantel with mirror. Dining-room is connected with kitchen by a pantry, which is well fitted up with shelves, drawers and cupboards. The kitchen is wainscoted with hard plaster, and it is fitted up with the usual fixtures complete. The second floor contains three large bedrooms, closets, servant's bedroom and bathroom, the latter wainscoted and furnished with the usual fixtures and exposed nickelplated plumbing. There is one bedroom and trunk room on third floor. The cellar contains furnace and other necessary apartments. Cost $3,300 complete. Mr. John Winans, architect and builder, Prohibition Park, Staten Island.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

The Palais Royal to be Demolished.

Though it is no longer the abode of royalty, and has long since ceased to be the centre of Parisian life, the Palais Royal is nevertheless so familiar a landmark of the French metropolis that the news of its projected demolition and conversion into a huge hippodrome, similar to that which formerly disfigured the Avenue de l'Alma, will come as a shock to the readers of the *Tribune* who have visited this city as tourists or lived for any length of time on the banks of the Seine. Built by the great Cardinal Richelieu in 1620, it has undergone many strange vicissitudes since then. It originally bore the name of the "Palais Cardinal," which was changed when Richelieu presented it to King Louis XIII. to its present name of "Palais Royal." On the death of this monarch it was used as a residence by Queen Anne of Austria, Regent during the minority of Louis XIV., who was brought up there, and who, in 1700, gave it to his nephew, the Duke of Orleans, as part of his marriage portion, on the occasion of his union with Mlle. de Blois. Toward the close of the eighteenth century the debts of that Duke of Orleans who bore the surname of "Egalité" grew so enormous and pressing that he transformed the apartments on the ground floor of the palace into shops for the purpose of increasing his revenue. During the First Empire it was inhabited by Prince Lucien Bonaparte, and after the Restoration by the Duke of Orleans, who afterward ascended the throne under the title of King Louis Philippe, the latter assigning it as a residence to his eldest son and heir, who was killed in the Rue de la Revolte, while trying to get out of his carriage in a runaway. In 1848, it was entirely devastated by the revolutionary mob; but after the *coup d'état* of 1851 was put into complete repair preparatory to being occupied by Prince Napoleon and Princess Clothilde. Since the overthrow of the Empire the residential portion has remained unoccupied, gradually falling into decay, while, with the drift of Parisian life westward, it has gradually ceased to be the popular resort that it used to be during the first fifty years of the present century. In those days all the principal restaurants were within its precincts, the "Véry," the "Véfour," and the "Trois Frères Provençaux" being among the most famous. Interspersed among these restaurants were the principal shops of the capital, especially those devoted to the sale of jewelry, while upon the first and second floors were all the leading gambling resorts. Indeed, there is probably no single spot on the entire Continent of Europe, not even Monte Carlo, where such immense fortunes have been squandered as at the public tables of Frascati and of other gambling-shop keepers of the same stripe. The gardens, adorned by beautiful fountains, statues, and fine lime trees, constituted the daily afternoon resort of all that was most brilliant in the political, literary, military, and social world of Paris; and if the weather was bad the rendezvous took place underneath the spacious arcades which surround the building, both on the outside and inside.

A Quick Piece of Work.

One of the quickest pieces of work on record in the way of installing a ventilating plant was recently completed at Harrisburg, Pa, says the *Engineering Record*. It may be remembered that the building containing the assembly rooms of the Senate and House of Representatives at the State Capitol was destroyed by fire on February 2. An unoccupied church was temporarily secured, but, this building being without a suitable heating plant or any ventilation whatever, it was necessary to install a new plant before the building could be occupied. Accordingly, an order was telegraphed on February 4 to a blower company, instructing them to ship two 6,000 foot coils with 60 inch fans as soon as possible. One apparatus was placed on board the cars within twelve hours and the duplicate within thirty hours from the receipt of the order. In the mean time, a large force of men was at work on the ground, putting in the foundations, steam mains, and air piping required for the apparatus. The heating plants were completed and the building ready for occupancy within one week from the date of the fire.

Largest Hotel on Earth.

The largest hotel structure in the world is to be erected in Boston the coming year, and its total cost will be something over three million dollars, says the *Southern Manufacturer and Builder*. The building will be eleven stories high, but owing to its well proportioned lines it will not have the appearance of being extremely tall. It will be built of fancy buff brick and terracotta, and in effect will be something like the Charlesgate. The design is after that of the palace of the Duke of Mecklenburg-Schwerin, in the north of Germany. The hotel will be in three sections, each one containing more than 700 rooms, and making a total of 2250 separate apartments. The plans provide for an open court between each section of the house seventy feet wide, and giving ample light to the rooms facing it. Then in each section there will be an interior court thirty-five feet square. The dining-room is to be on the north side, next to the river, a handsome one story structure, divided by an ingenious arrangement of lines into a number of cozy, half shut in apartments. The suites will be of various sizes, and each will have the advantage of a double elevator service, one set of elevators being for passengers and the other for freight. There will be twenty-one elevator wells in the building. The hotel is to have one of the most beautiful banquet halls in the country, and a magnificent ballroom as well. In addition to this it will have an ice skating rink, which will be used in the summer as a bicycle pavilion. The hotel will be specially fitted for the purpose. There will be an elaborate refrigerating apparatus in the hotel, and this will be used to make ice for the skating rink, the floor of the rink being flooded and the water congealed by the same method as employed in the Niagara rink in London. Many other unusual features are in the plans.

A CORRECTION.—In the July issue of the Building Edition an error was made in crediting Mr. F. E. Webb as being the architect of the residence of Mr. Robert H. Rose, of Binghamton, N. Y. Credit for this handsome building should have been given to Mr. R. W. Reynolds, of Binghamton, N. Y., and we now take pleasure in making this correction.

Drawing Materials, Surveyors' Instruments, Etc.

The 1897 catalogue of the Keuffel & Esser Co., 44 Ann St., New York, has considerable new matter, and its entire text and illustrations are well worth the attention of artists, draughtsmen, surveyors, architects, and engineers. The book has 424 pages, and we are informed that 400 of its engravings are separately copyrighted, as well as the text. The company has long held a leading position as manufacturers and importers of drawing materials and surveying instruments, and has a most enviable reputation for furnishing the widest variety and the very highest qualities of everything which any one may desire to purchase in its line. The reading matter of the book also affords a most excellent guide to a sound judgment when one is selecting either instruments or materials.

A STATUE OF MERCURY AT THE NASHVILLE EXPOSITION.

The illustration represents a statue of "Mercury," twelve feet high, made in heavy gauge sheet copper, oxidized to represent antique bronze, a very artistic and perfect piece of work, made for the Commerce Building Exposition, at Nashville, Tenn., by W. H. Mullins, of Salem, Ohio. This statue is equal in every respect to cast work, and, being much lighter in weight, is easily and securely fastened in place. By the process of manufacture every line and detail of the model is brought out perfectly in the finished figure. Mr. Mullins submits photographs of model to a customer for approval before completing the work, and from these he can tell exactly in regard to the work when completed. He also furnished bas-relief figures for gable panel of this building. In centre the coat-of-arms of Tennessee, immediately

above this the caduceus and winged wheel of Commerce, and on each side of the coat-of-arms are bas-relief figures, cotton bales, barrels, etc., all made in sheet metal, making a very handsome and artistic panel.

Compo-Board.

Compo-board, which is sold by E. G. Soltmann, Compo-Board Department, 164 West Forty-sixth Street, New York city, is a serviceable substitute for lath and plaster. Compo-boards in large quantities are carried in stock in the following sizes: 4 x 8, 4 x 9, 4 x 10, 4 x 12, 4 x 14, 4 x 16, and 4 x 18 feet, all of which are about one-quarter inch thick and weigh about one pound to the square foot. Where plaster of good quality weighs about six pounds to the square foot, which causes an enormous weight and strain upon the frame of the building, the compo-boards, in addition to weighing only about one-sixth of plaster, act as a brace, because they are nailed to all the uprights or studs. A fair-sized dwelling house may have about 10,000 square feet of wall and ceiling surface, and the difference between 60,000 pounds of plaster and 10,000 pounds of compo-board will be appreciated by every builder.

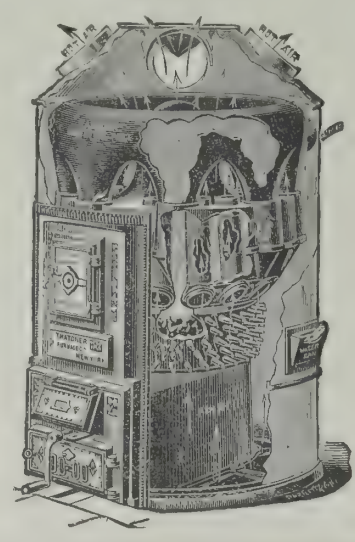
Compo-boards are useful for a great variety of purposes. By nailing directly to the beams or studs, which must be placed sixteen inches to centres, the compo-board forms a flat lining, which keeps out draught, and will be warm in winter as well as cool in summer. In addition to being useful for dwelling houses, it is also adapted for walls and ceilings of lecture rooms and large halls, bicycle academies, factories, schools, etc., also for protecting against cold in outhouses, barns, stables, henneries, and other detached buildings. As the lower part of a plastered wall is often indented with furniture, door-knobs, etc., a serviceable wainscoting can be made with compo-board. When a plaster ceiling has partly fallen or is ready to fall, it is not necessary to take it down, but furring strips may be run at right angles to beams, set sixteen inches to centres, to which the compo-boards can be nailed. If the plaster ever does fall, it rests upon the compo-boards, where it can remain indefinitely. Such ceilings may be painted or papered, and look like plastered work. An excellent blackboard is also sold by the firm—a board made of compo-board, covered with a liquid slating, applied with a trowel, and this is the only blackboard that can be furnished up to 4 x 18 feet in one piece, without weighing more than about two pounds to the square foot.

For repainting old blackboards, or transforming a plastered wall into a blackboard, an excellent composition is sold which is known as compo liquid slating.

Samples of compo-board, etc., may be obtained by sending to the above address.

IMPROVED HEATERS AND FURNACES.

The accompanying illustrations represent a few of many styles of warm air furnaces, ranges, steam and hot water heaters, etc., manufactured by the Thatcher Furnace



THE THATCHER TUBULAR FURNACE.

Company, of No. 240 Water Street, New York city, whose works are at Newark, N. J. The company is an old and highly successful one in this line of business, and has recently about doubled its capacity. The Thatcher improved tubular furnace, either portable or brick set, and adapted for either hard or soft coal, is the invention of Mr. J. M. Thatcher, who has devoted more than forty years to the science and manufacture of warm air furnaces and ventilation. It is entirely original, simple in construction, and there are no complicated or concealed flues to fill up with ashes or soot. It is practically self-cleaning, and, owing to its tubular construction, which carries away the heat as fast as made, not allowing the air to become burnt or overheated, is unexcelled from a sanitary point of view. For this reason, also, it lasts so long without requiring repairs, and when any part gives out it is easily replaced. The Thatcher tubular furnace gives a large flow of pure warmed air. It is absolutely gas-tight. It is very economical and exceedingly durable. After more than thirty-five years' use, the pointed fire-pot has proved superior to any others. The advantages over plain ones are so apparent that it more than pays for the extra trouble of making them. The points are about three inches long, and cast solid to the fire-pot. This not only strengthens it, but adds greatly to its heating capacity, each point acting as an independent radiator, giving several hundred inches more of radiating surface. They also separate the cold air, thus heating a larger quantity much quicker than it is possible to heat a solid body of air passing over a smooth surface. Another

THE EMPIRE STEAM HEATER.

important feature is that the pot is straight, which allows perfect combustion, and will not accumulate ashes along the sides. Many years ago Mr. Thatcher experimented with the sectional or two-piece pots, but found the solid one, if properly made, much stronger, as dividing the pot weakens it, and consequently burns out sooner. Resting on the fire-pot is a heavy body, cone-shaped at the bottom, so that no soot or ashes can accumulate. Passing through this body around the sides is a series of heavy cast-iron tubes, perfectly gas-tight, through which a large amount of air passes from the outside.

The Empire steam heater, shown in one of the views, is made to meet the demand for a small, substantial, first class boiler, with large heating capacity, which can be sold at a moderate price. It is beautiful in design and compact in form. It is all of cast iron, and has a cast-iron casing. The boiler proper is cast in two pieces only, the fire-pot and dome being one piece, and the section above the fire-pot the other. These two pieces are connected by a large screw nipple. The two castings are brought together by this nipple upon cast-iron bosses with ground surfaces, so that fire does not reach this nipple connection, and we guarantee it absolutely tight. It is fitted and mounted at the works, and shipped as one piece of casting. The ash-pit is deep, and cast in one piece. It has an improved revolving grate, with the teeth at tangents, so the coal cannot drop between the grate bars. The grate is so arranged that it can be easily removed by taking off the front plate of the ash-pit. The heating surface is very large. The fire is completely surrounded by water, and the products of combustion passing through the openings on the sides and back of the dome are obliged to pass over the entire outside before going through the openings in the front of the upper section; it then goes over the upper section, passing through a revertible flue to the smoke pipe; therefore, every inch of surface is utilized, thus making the Empire boiler the most effective and economical heater made. The heater is arranged with a direct and indirect damper, which is a new feature upon this construction. The top section acts as a superheating dome, making very dry steam, which is very essential to a quick working heater. The water-line is positively steady, the Empire boiler requiring no equalizing pipe to accomplish this result.

The No. 80 Thatcher range is portable and has low closet. The fire-box is made either right or left side of range. The oven is 19 inches wide, 18½ inches deep, and 11½ inches high. It is made with revolving or flat grate, and furnished with or without water back, and with or without warming shelf. These ranges are the highest

No. 80 THATCHER RANGE.

types of such goods made, of beautiful design, and thoroughly first-class material and workmanship.

Stair Builders' Goods.

Many new and beautiful designs of newels, balusters, arch and grille work, panel work and wainscoting, etc., are shown in the illustrated catalogue which Messrs. S. E. Smith & Bro., of St. Paul, Minn., are sending to their friends and customers. Special attention is called to their line of round, square, and twisted balusters, and to numerous designs for modern and Colonial stairs. The firm have also perfected machinery for cutting beautiful geometrical designs in solid wood with great accuracy and neatness of finish, and their outfit of special machines and machine tools enables them to turn out the highest grade of work at lower prices than would have been deemed at all possible a few years ago.

Architects' and Builders' Directory.

Hendricks' Architects' and Builders' Guide and Contractors' Directory, of America, for builders, contractors, manufacturers, and dealers in all kinds of building supplies, for the years 1896–1897, is published by Samuel E. Hendricks Company, No. 61 Beekman Street, New York city. This is an extremely valuable work for all who are in any way identified with the building trades. It includes a classified list of architects by State, cities and towns. There is also an alphabetical list of architects which enables any one to obtain the exact address of any architect at once. Then follow the lists of manufacturers of all kinds of articles relating to the building trades. This section of the work is very carefully classified under common-sense heads, which enable any one to find at a glance the maker of any article wanted. The work can be commended most highly. It is a large octavo volume of 886 pages, and sells for five dollars.

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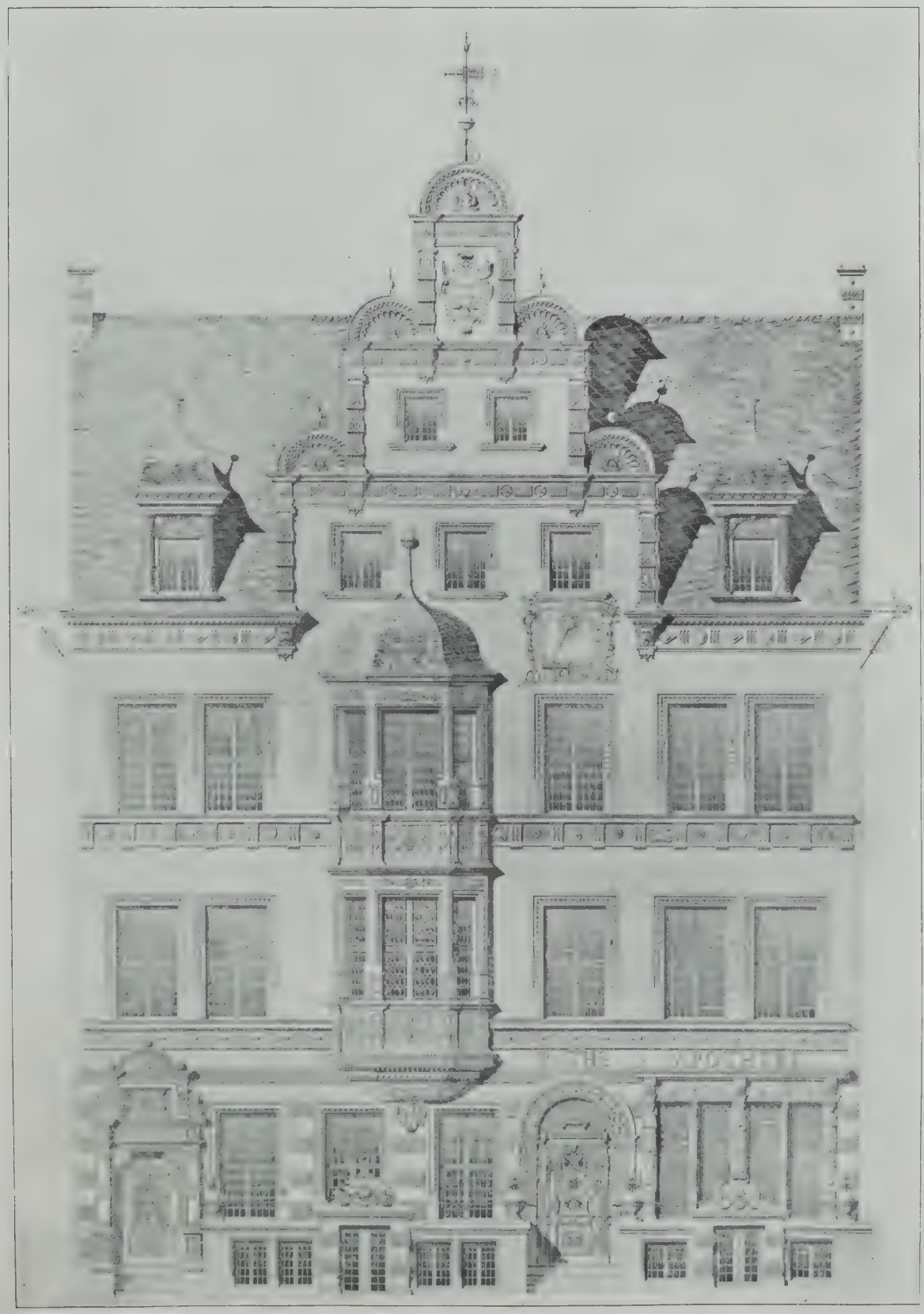

BOSTON PUBLIC

THE NEW RATHSAPOTHEKE IN BREMEN.—See page 39.

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THE

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NEW YORK AS A FURNITURE MARKET.

Odd as it may seem, when all the traditions of trade are considered, New York does not control the furniture market. That is managed from a great distance. The West *has been* the governing power in the wholesale trade. One would suppose that, with all her apparent advantages, such would be really the case in regard to the great metropolis of the country—the seat of so much learning, the actual centre of national luxury, the abiding-place of art itself. Associated, too, with the eminence of so many other industries, what is more natural than to look for New York's eminence in this field also?

Lamentable as it is to relate, however, such is not the situation as the facts present it. It is true that the *market* is here. No one can deny that. Here is where the trafficking is done. Here is the greatest point of consumption. But the bulk of the manufacturing has undoubtedly been in the West. Why? Simply because the West has displayed the greater intelligence, and because it is nearest the sources of lumber supply. It has led in the creation of styles through its quick comprehension of what the public wanted. The East was for a long while too conservative, too indifferent, too opinionated, to be convinced of any necessity for a change. Old forms were thought to be well enough. German lines had long been employed, had paid, and why, therefore, adopt French ideas? But Western capital sought artistic talent and scholarly information, while Eastern stupidity slumbered. It gave large salaries to competent designers, and produced a revolution in the fashion of furniture. When the East awakened to the fact, all trade had gone West.

With the advent of new fashions in forms, came the adoption of new materials, demanded by the particular character of the styles established. Black walnut, the product of its own territory, and of which the West had had the monopoly, was summarily relegated to a sudden oblivion. With its exit, the Western market in lumber changed immediately in its character, and mahogany, bird's-eye maple, curly birch, and quartered oak superseded it. For the West there was a triumph achieved in more than one respect in this revolution, for, with the exception of mahogany, it was still nearest the source of supply, the northern part of Wisconsin supplying curly birch; Indiana, Ohio, Illinois, Arkansas, and Missouri, plain and quartered oak; and Michigan, bird's-eye maple

Hence, New York is now thoroughly aroused to the exigencies of the case, and will make every effort to recover the wholesale manufacture of the medium and high grades of furniture, and to market the cheap grades coming from the South—where labor can be had from forty cents to ninety-five cents per day, and lumber from $5 to $10 per thousand feet, as against $1.50 to $2.50 per day for Western labor, and $28 to $60 per thousand feet for lumber in the West. The greater proximity of the South to New York by water, permits freights to be from 33⅓ to 50 per cent. less than those of the West. So far as the cheap grades of furniture are concerned, it may be said that, with the brains of the West directed to their manufacture in the South, with all her natural advantages, the result would be to transfer the manufacture entirely to that fertile and alluring part of the country

There are three advantages in favor of New York which her great rival, the West, does not possess. They are natural ones—incontestable, irresistible, overwhelming. These are location, wealth, and population. The main seaport of the United States, the great gateway of immigration, the foremost manufacturing city of the New World, and second only to London as a financial and commercial centre, no other American city furnishes such manifold and unbounded opportunities as New York does. There is but one New York.

Only five years ago there were 11,000 factories in New York, one-fourth of which were devoted to clothing, cigars, furniture, and printing. Three hundred shops then made $3,000,000 worth of furniture. Now, the capital invested in furniture is even greater, and the output is larger still. Among the exchanges is the Furniture Exchange, established six and a half years ago, and which claims that it has been successful in bringing to New York semi-annually, from 1,000 to 1,500 furniture dealers, and from 100 to 150 manufacturers.

Its thirteenth exposition, which closed last July, brought together, according to its official reports, buyers representing the principal retail concerns of a wide territory. The exhibitors, consequently, appear to have obtained a fair percentage of early orders, and returned home with business enough to keep their factories humming right along until the resumption of late trade.

Furthermore, the indications are that there will be a large late trade, and that the general improvement which has marked the situation in the furniture world, is not only steady in its character, but quite sure as to its probable results.

All this is very encouraging in relation to the wholesale furniture trade, which is specially considered here, but it does not go far enough. The fact remains that the West still "holds the palm" in the wholesale manufacture of furniture. Her sales preponderate because she is nearest the source of the lumber supply. Much must be conceded, so far as enterprise is concerned, to this distant manufacturing centre, as has been already stated. It is not without a certain local pride that the admission must be made that this very enterprise is the enterprise of young Eastern men, whose energy and watchfulness maintain the balance in their favor.

There is no question as to the position of the fine retail trade associated with interior decoration. All the contracts of any importance which the West herself has to give out of this nature, come directly to New York. The Applied Arts have risen to such an important and dignified position here, that this goes without saying in respect to this class of work. Western millionaires prefer New York furniture and New York decoration.

The attempt to compromise the perplexing features of the condition of the furniture trade in the United States should meet with every encouragement here in New York, where the tendency is directly in favor of a concentration of interests, not merely in the retail trade, which evinces a certain independence of its own, but in the wholesale trade itself, which has taken an admirable stand pertaining to this matter. If New York must be the place of sale, as the remarkable trend of things in the history of the subject here plainly outlines, then New York must also be more a place of manufacture for furniture than it now is. In harmony with this conclusion, it is not difficult to foreshadow the result.

The suburbs of the city offer unusual opportunities in the way of manufacturing facilities for medium and high grade furniture, and by wise arrangement, labor can be had at a low average of cost that will compare very favorably with the rates maintained in the West. In regard to the land: Capital recently invested in suburban properties, furnishes very tempting inducements for the creation of woodworking plants in the vicinity of New York, with the accompanying settlements for operatives incidental to the establishment of these manufactures. In relation to labor: A new avenue of employment is opened to thousands of young people through the founding of trade schools, and schools of decoration and design, in conjunction with such enterprises.

Concerning the cost of living: The plan of arrangement connected with the building of such settlements, owing to the improvements in present construction, in sanitary science, and to the superior information pertaining to the laws of hygiene at this time, would be likely to be of a very attractive character. The architectural features would be at once novel and charming; for nowhere is there greater talent in any part of the country than among our local architects, who are ingenious, versatile, and practical. There is a quality of distinction to their work which makes it essentially their own, evincing, as it does, that cosmopolitan atmosphere which is the best test of intelligence.

An industrial community such as is described, would contain within itself so much of individual prosperity through cheap rent, low cost of living on some co-operative plan *unanimously* assumed, and by its control of patronage through its thoroughly systematic organization, and trained expertness in the several branches of industry it represented, that competition, such as the furniture market in New York now has to contend with, would be entirely out of the question.

Already there are very promising signs of such plants as, for example, can be found at Rochester and Syracuse. A prominent decorator introduced, a few years ago, in the suburbs, the manufacture of the Gobelins tapestries of France, and originally imported native workmen to do the work. His experiment was successful, and the results in the drawing-rooms which have been decorated with the American product, have elicited the unstinted praise of the best connoisseurs.

As to the wholesale Western manufacturers, their freights on mahogany, only to be had by way of New York, and their freights on the finished products in that wood, which the purchaser in this market has to defray when he buys his merchandise of them, dispose of all arguments as to their superior facilities in labor and material in the manufacture of mahogany furniture. The material is at our door. The cost out West is offset by the freight charges mentioned Let us, therefore, boom all varieties of mahogany furniture, for here we have the advantage of being nearest the source of supply ourselves.

It is appropriate at the moment to discuss the situation in connection with the furniture trade, for the Fall season has just opened among retailers with unusual briskness, and householders and housebuilders have a special interest in becoming acquainted with the cost of furnishing houses, as well as with the styles offered for sale at the various shops.

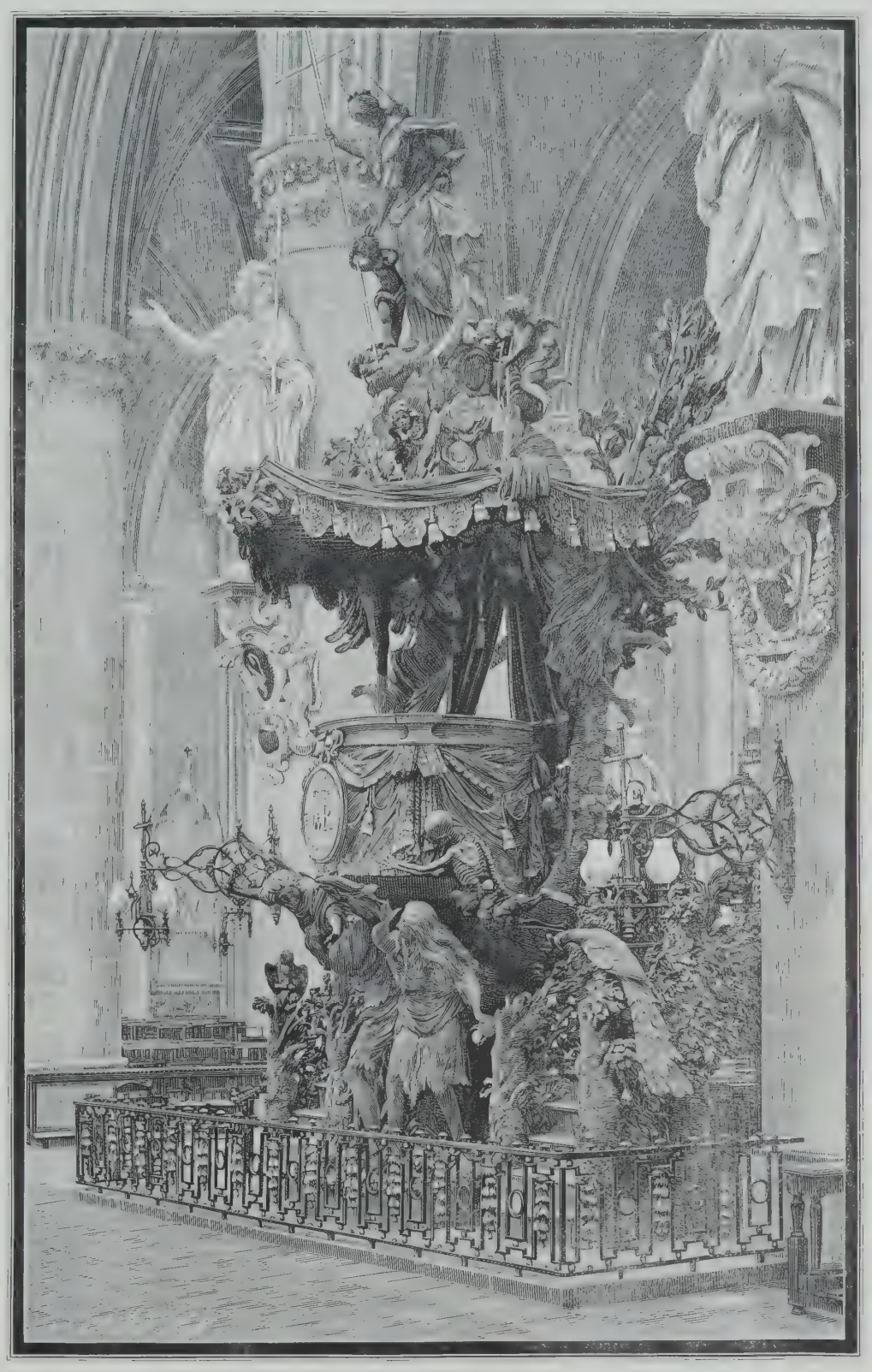
Unfamiliarity with the character of the stock afforded by the New York furniture market prevents many from securing as satisfactory returns for their expenditure in house furnishing as would otherwise be the result if they knew the amount, as well as the variety, of articles that can be purchased for a given sum.

Let the householder visit all the best retail stores and prosecute his inquiries personally. He will be astonished at the tempting bargains which are offered, as well as at the richness and general beauty of the effects which have been produced.

PULPIT OF THE CATHEDRAL OF SAINTE GUDULE, BRUSSELS.

This pulpit, which is the chief attraction in the Cathedral of Sainte Gudule, Brussels, was originally in the Church of the Jesuits at Loeven (French Louvain), Province of Brabant, Belgium. The Church of Sainte Gudule was begun in 1220 and finished about 1650. It was erected by a celebrated carver of that time, Mr. Verbruggen, and is considered one of his finest works. It is a representation in carved wood of the Expulsion from Paradise. Among the foliage are all kinds of animals—bear, fox, eagle, vulture, peacock, owl, dove, squirrel, ape eating an apple, etc.

Above is the Virgin with Child, crushing the head of the serpent with the Cross. On the pillars of the nave are, massive, the Twelve Apostles; only one and a part can be seen in the picture. The façade, in its principal features, resembles rather the German than the French style. The church is situated on a slope overlooking the lower part of Brussels, and its west entrance is approached by a handsome flight of steps, completed in 1861. The interior contains some very beautiful stained glass of different periods; most of the modern glass, however, represents biblical subjects. Many of the windows contain portraits of historical personages, and there are also some fine monuments.



PULPIT OF THE CATHEDRAL OF SAINTE GUDULE, BRUSSELS.

A COLONIAL RESIDENCE AT SPRINGFIELD, MASS.

We present on page 43, in this issue, a residence recently completed for N. N. Fowler, Esq., at Springfield, Mass. The engravings present a design of Colonial treatment, with swell bay windows, and a colonnaded entrance porch at front, together with the porte-cochère entrance at one side and a private piazza on the other. The underpinning is built of brick. The exterior framework is covered with sheathing, paper, and clapboards, and then painted colonial yellow, while the trimmings are painted ivory white. The roof is shingled and left to weather finish. Dimensions: Front, 44 ft.; side, 67 ft., not including porches. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The plan is excellent, with a large hall running through the centre of the building, with rooms placed on either side. The vestibule and halls are trimmed with quartered oak, and each have paneled wainscotings. At the intersection of hall and staircase hall, a cluster of arches is provided, with spindle transoms. The stairway is an ornamental one, with spindle balusters, and newel post formed of a cluster of similar balusters. The parlor and library are trimmed with cherry, and both have open fireplaces with tiled hearths and facings, and mantels of similar wood and handsomely carved. The sitting and dining rooms are trimmed with quartered oak, and they have open fireplaces and bay windows. The kitchen and its apartments are trimmed and wainscoted with Michigan pine and finished natural. The butler's pantry and store pantry are fitted up complete. The icebox room gives ample space for box, with an outside entrance thereto. The second floor is trimmed with red birch, and it contains four bedrooms, large closets, and bathroom, with linen closet, and two servants' bedrooms and bath in the extension. Bathrooms are wainscoted, and are furnished with porcelain fixtures and exposed nickelplated plumbing. There are four bedrooms on third floor. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $13,000 complete. Mr. Guy Kirkham, architect Springfield, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

THE NEW RATHSAPOTHEKE IN BREMEN.

The old Rathsapotheke (pharmacy) on the west side of the market place in Bremen was a plain building, with a fine house on either side. It 1893, it burnt down partly, and the owner resolved to have it built up again in simple, some striking feature. The fire which destroyed the "Apotheke," and the reconstruction taken in view, now offered an opportunity for creating such a centre of attraction

The idea of making use of the occasion found the approval of the owner, and a vivid interest in the plan was shown by the architects, artists, and citizens of the town. The funds required were soon collected, and in the course of the years 1893 and 1894 the new front was built in the noble style of German renaissance, according to the plans of Salzmann. The cost of the sandstone front and the roof covering amounted to $10,500, of which the owner and the city authorities contributed $3,750, the remainder being the sum donated by various art-loving citizens.

The sandstone was obtained ready finished from Bunzlau (Silesia); the coppersmith and locksmith work was done by men of the town.

The new front of the Rathsapotheke, as yet glistening in untarnished gilding, forms a fitting pendant to the other fine buildings on the ancient market place. It bears a brilliant testimony to the ability of its designer, and to the love of art among the citizens, who are ready to make sacrifices for the sake of the artistic decorations of Bremen.—*Zeitschrift für Bauwesen.*

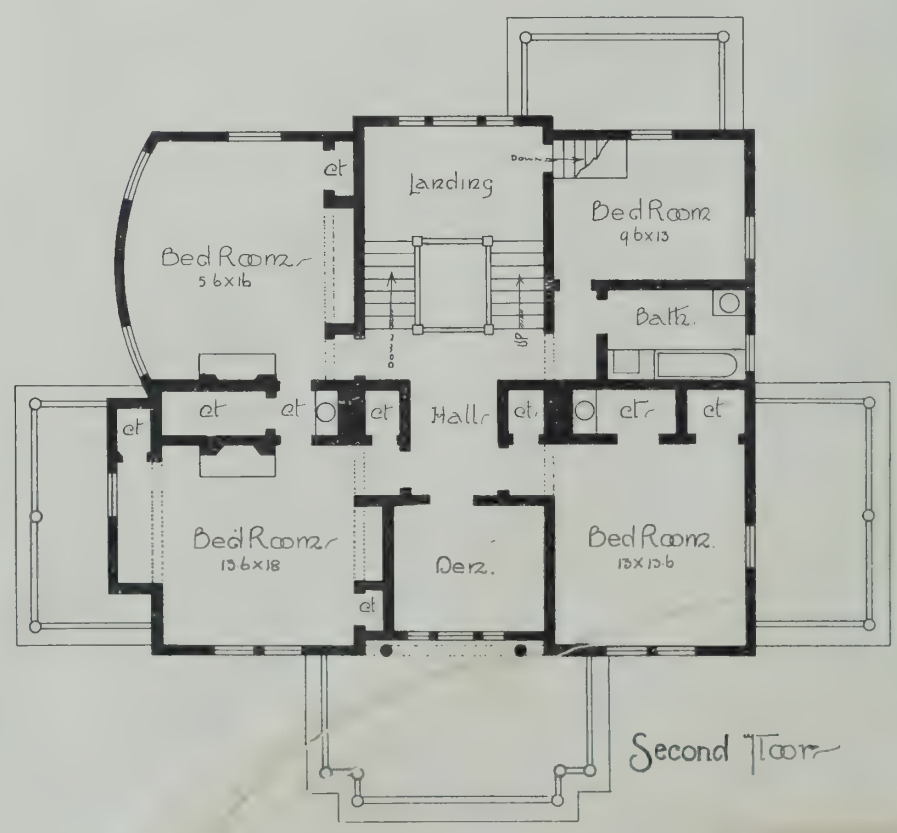
A RESIDENCE AT BENSONHURST, L. I.

We present as the subject for colors, and also on page 40, of this issue, a modern residence, which has been recently erected for Walter Jones, Esq., at Bensonhurst, L. I. The design is treated in an attractive style of architecture, with colonial feeling and classic detail. The several covered porches, the cluster and beaded windows, the dormer windows in roof, and the balustrade are all good features. The building is well constructed, and the materials and finish are of the best kind and workmanship. The foundation is built of good building stone, while the underpinning is built of rock-faced bluestone. The superstructure, of wood, is sheathed, papered, and clapboarded. It is painted light colonial yellow, with cream white trimmings. The roof is shingled and stained a deep red. Dimensions: Front, 46 ft.; side, 36 ft., exclusive of porches. Height of ceilings: Cellar, 7 ft.; first story 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The vestibule has a floor laid in tiled mosaic, and it has a nook on either side of same, with paneled seats and stained glass windows. The main hall is trimmed with quartered oak. It has a paneled wainscoting, a parquet floor, and a massive open fireplace built of brick, with tiled facings and wrought iron trimmings, and a massive oak mantel elegantly carved. The grand staircase is an open one from first to third floor, and it contains newel posts extending to ceiling, with the spaces between same filled in with ornamental carved fretwork, forming circular arches with transoms. The drawing-room is treated in white and gold, and it is provided with an open fireplace, furnished with tiles of white enamel, and a mantel carved in touch with the antique. Library is trimmed with oak. It contains a nook with paneled seat, and an open fireplace with tiled hearth and facings, brass trimmings, and a massive carved mantel with mirrors. Dining-room is finished with green oak, a very pleasing treatment, giving a cool effect. It has a parquet floor, china closet with beveled plate glass doors, and a fireplace (false) of Dutch treatment, with tile, wrought iron trimmings, and mantel. The door and window casings throughout this floor are massive, and are heavily moulded and carved. Kitchen and pantries are wainscoted and trimmed with Georgia pine, and finished natural. Each apartment is fitted up with the best modern fixtures complete. The second floor contains a den, four bedrooms, closets and bathroom. The hall on this floor is trimmed with ash, and the windows on landing are glazed with stained glass. Two of the bedrooms are trimmed with hazelwood, one with sycamore, and the remaining rooms with whitewood. The bedroom closets are provided with stationary bowls. Bathroom is wainscoted and trimmed with sycamore, and it has a parquet floor, porcelain fixtures, and exposed plumbing. Third floor contains three bedrooms and ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Mr. Walter Jones, architect and builder, Bensonhurst, L. I.

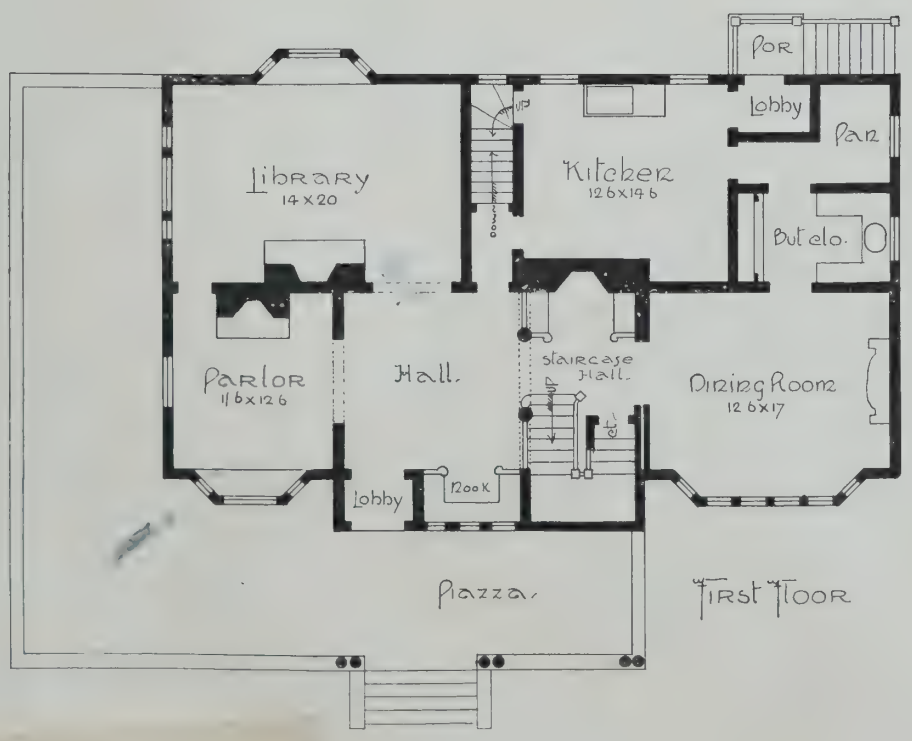
Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

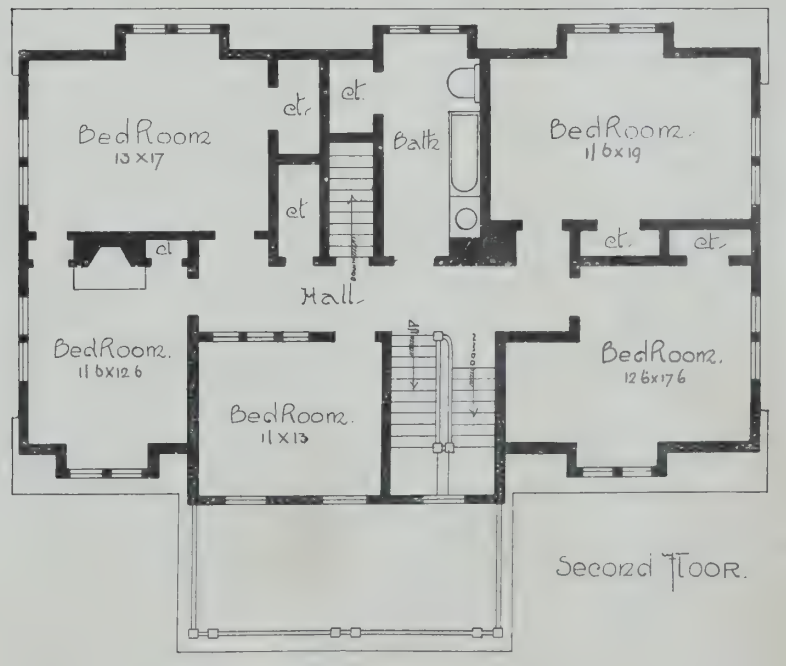
Advantages of Fresh Air in Apartments.

People who live by rule, and are not afraid of fresh air in their rooms, even at night, live far longer than those who disregard all these things. Fresh air seems to be looked upon by some men and women as their mortal enemy, and the rest of us have to suffer in consequence of this morbid terror of an open window. Girls, especially, suffer under such circumstances, and pale cheeks and dull eyes are all an outcome of lack of proper air to live in.—*Plumber and Decorator.*



A RESIDENCE AT BENSONHURST L. I.—See page 39.





A MODERN VILLA AT CHESTNUT HILL, MASS.—See page 52.

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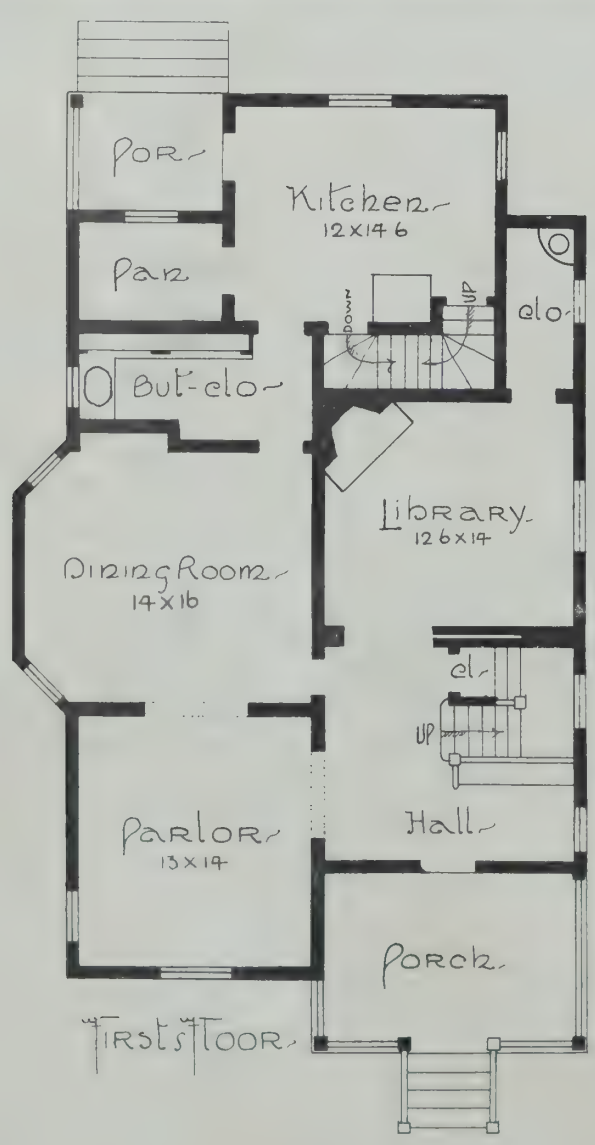

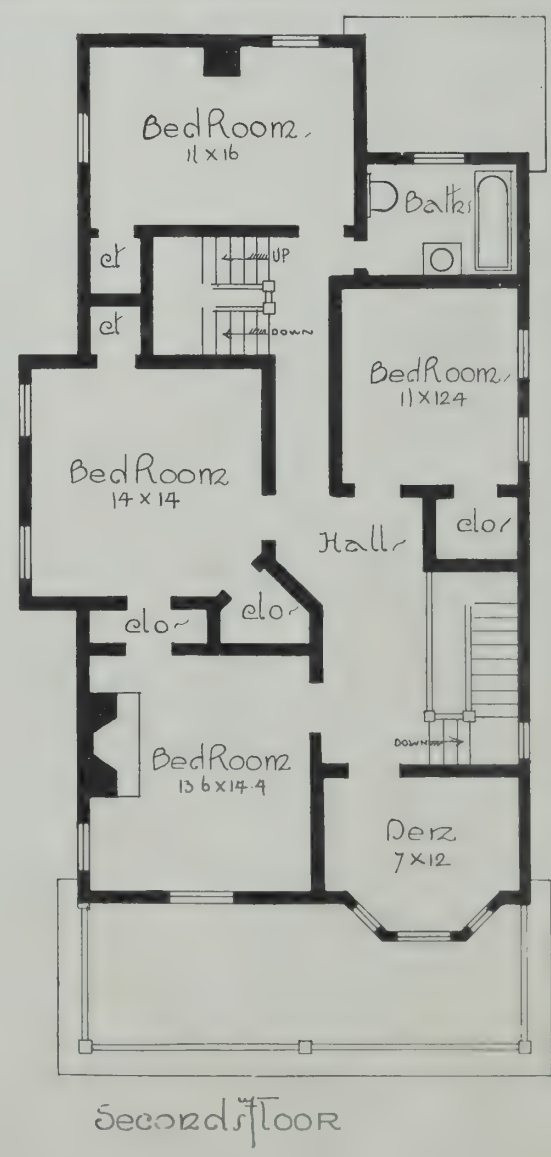

A RESIDENCE AT BINGHAMTON, N. Y.—See page 53.

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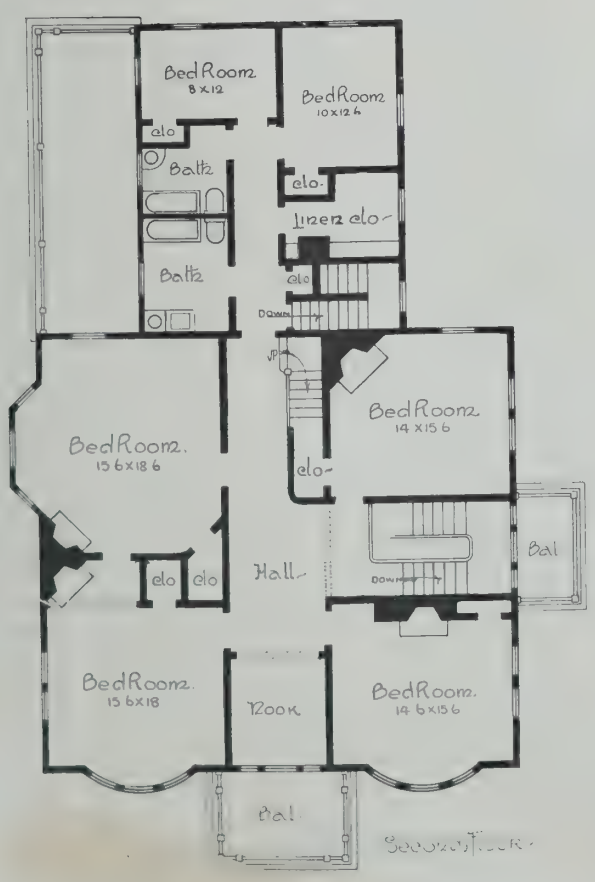
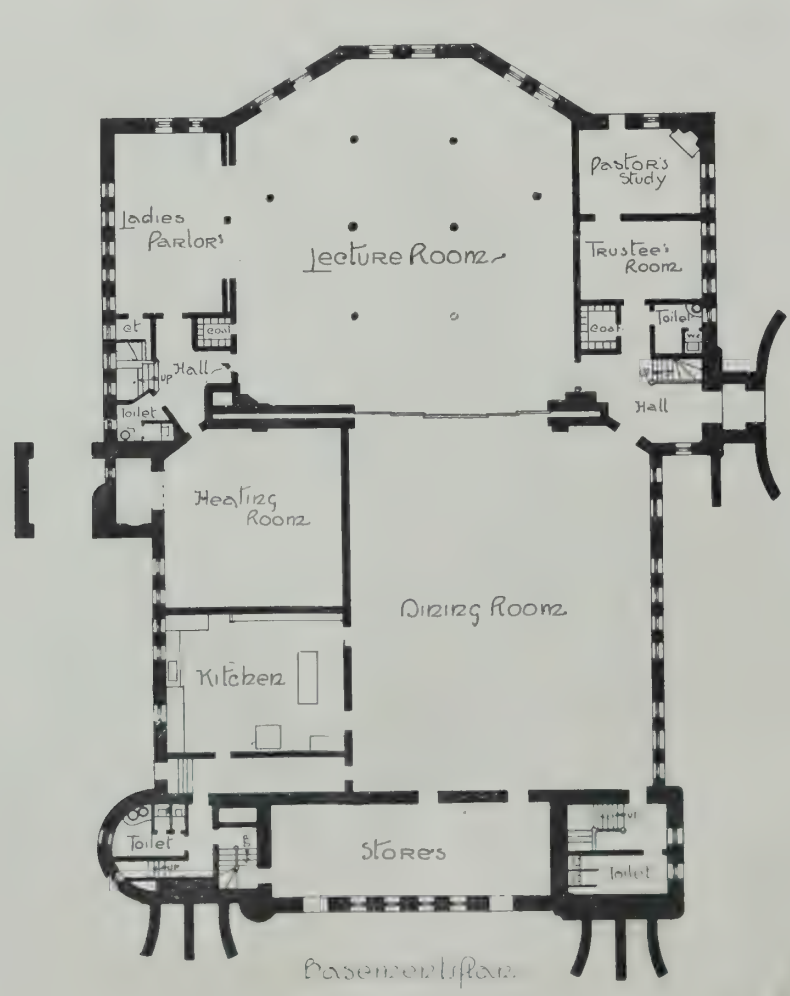
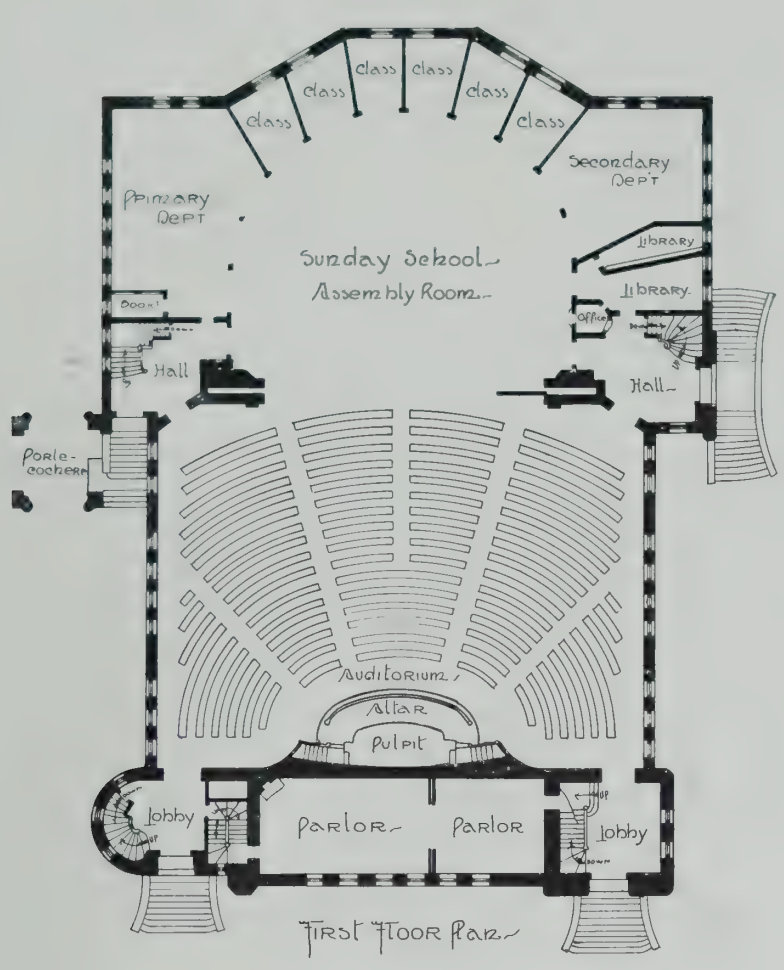
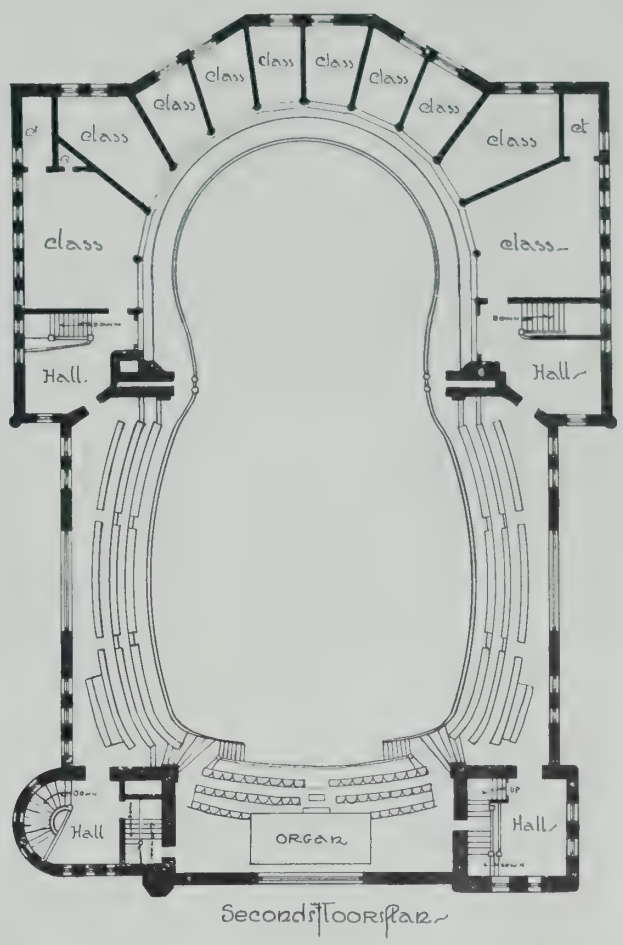


A COLONIAL RESIDENCE [illegible] 'ELD, MASS.—See page 39.



ELM PARK METHODIST EPISCOPAL CHURCH, SCRANTON, PA.—See page 52.





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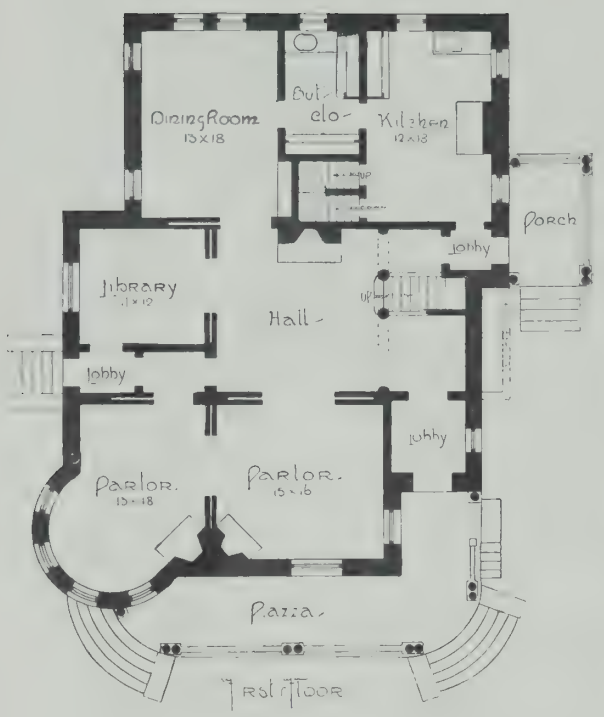
ELM PARK METHODIST EPISCOPAL CHURCH. SCRANTON, PA.—See page 52.



ELM PARK METHODIST EPISCOPAL PARSONAGE, SCRANTON, PA.—See page 52.

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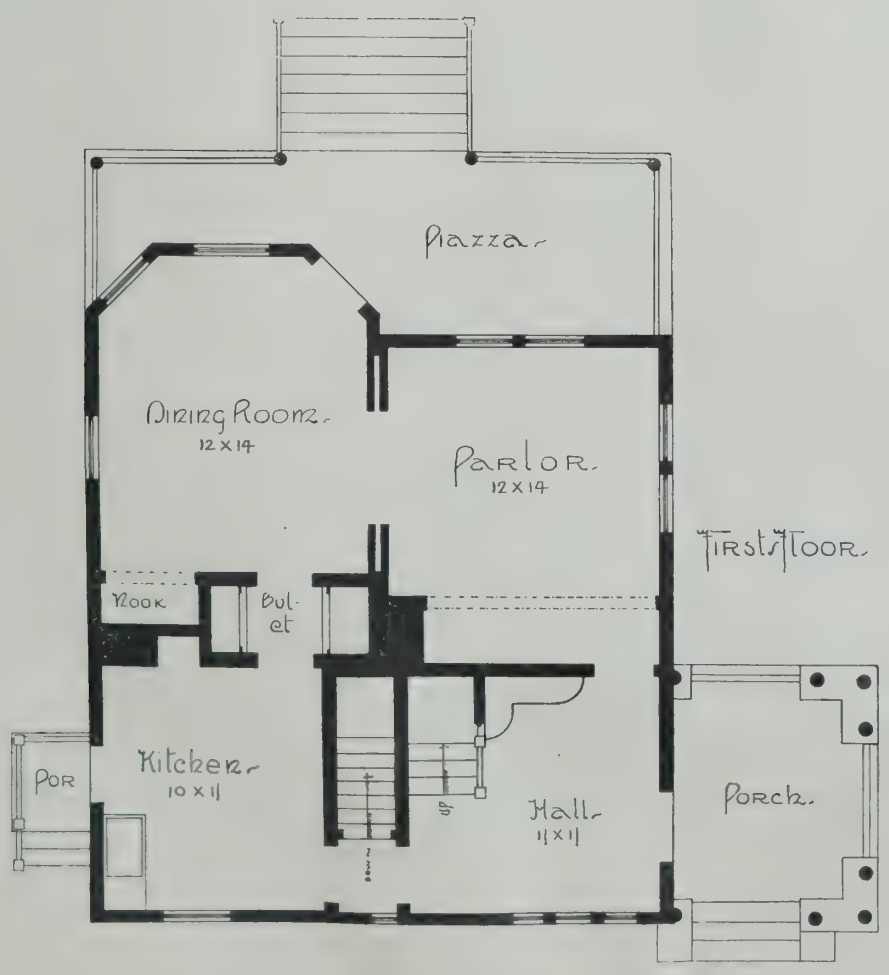
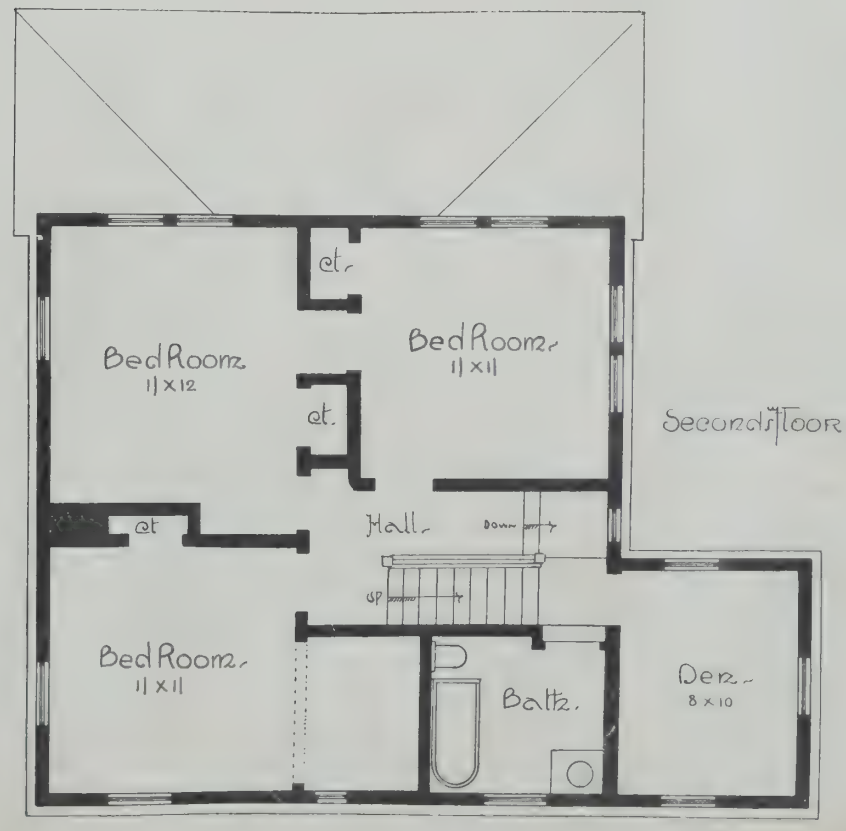
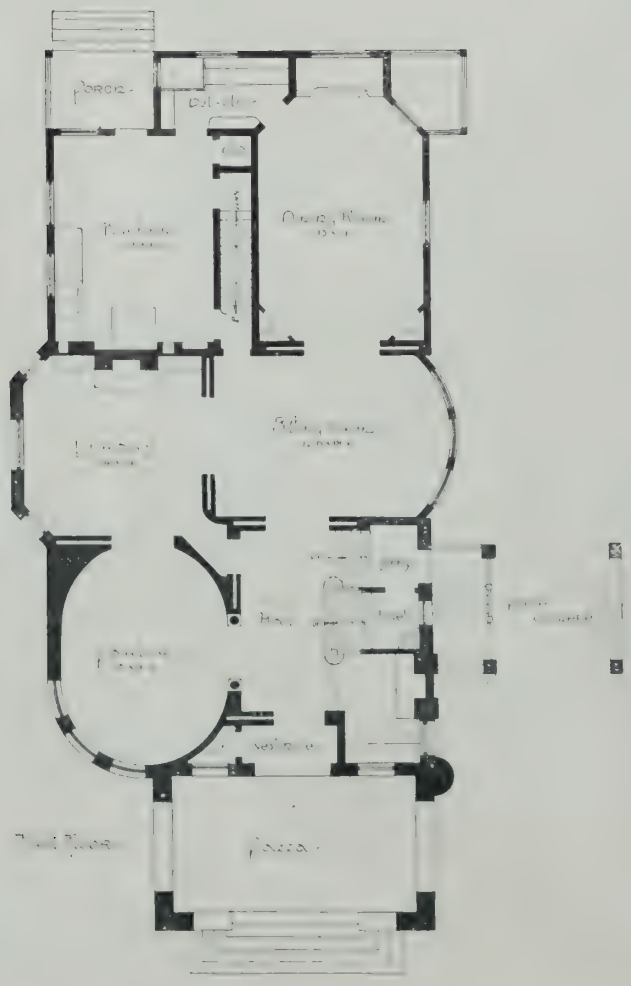


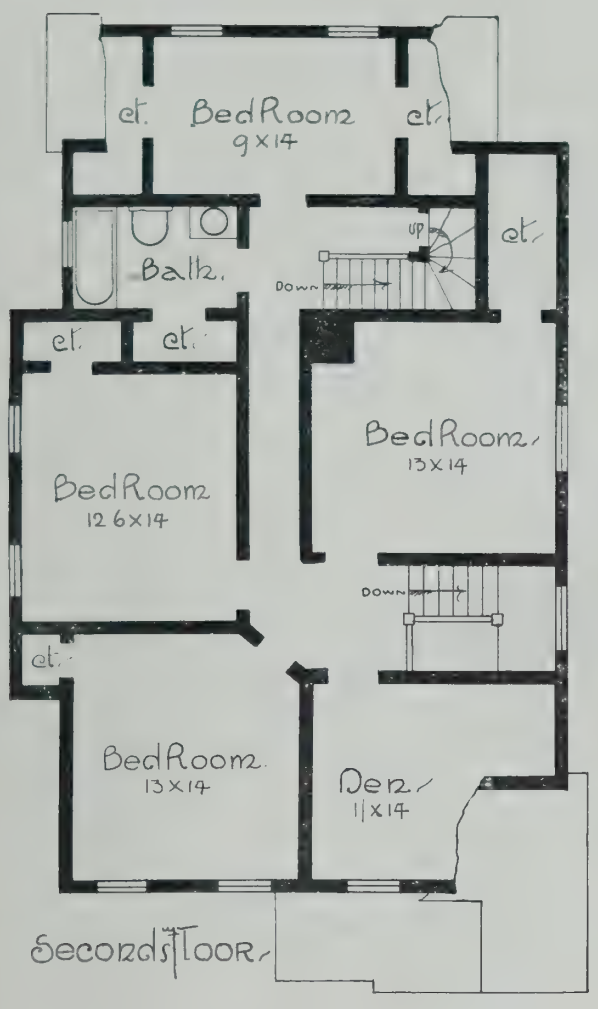


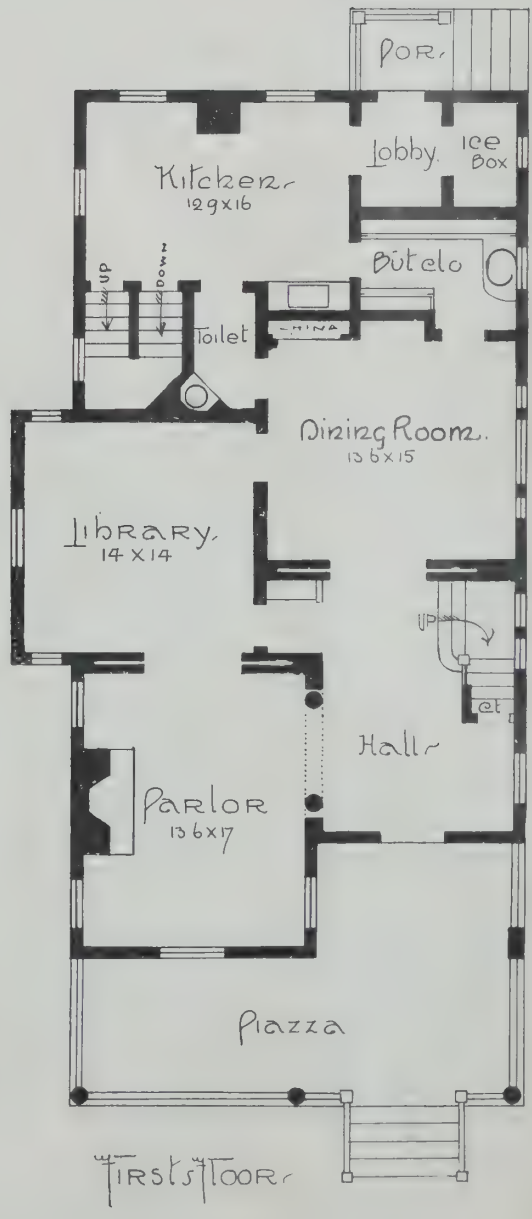
A MODERN COTTAGE AT NYACK, N. Y.—See page 52.



A RESIDENCE AT SCRANTON, PA.—See page 52.

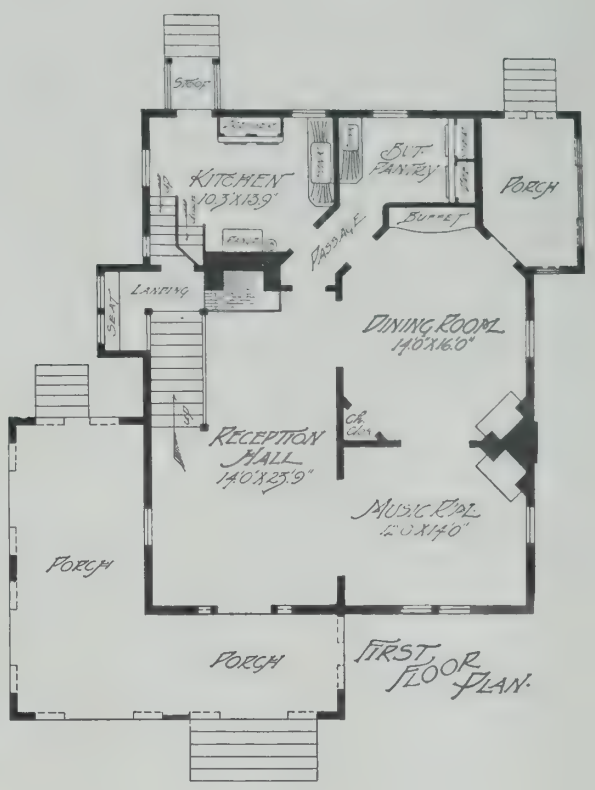
BOSTON PUBLIC

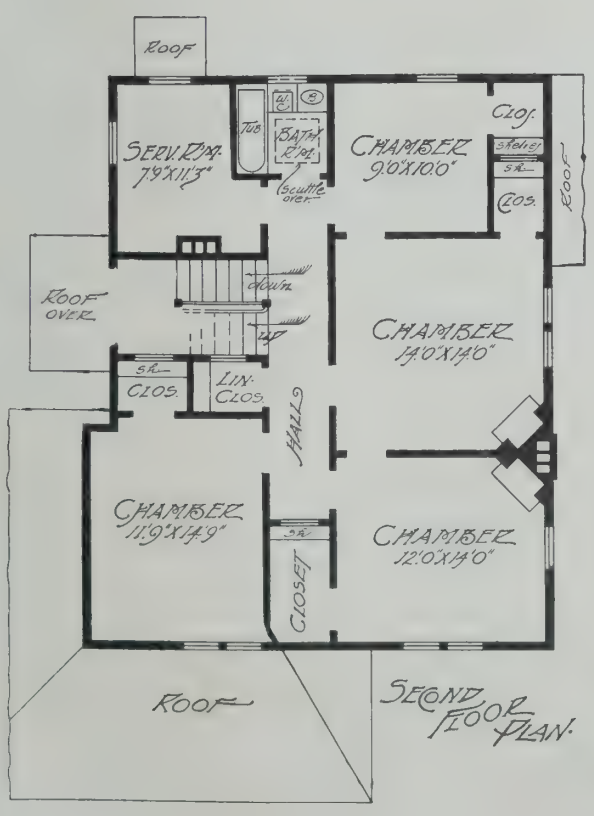




A COTTAGE AT BINGHAMTON, N. Y.—See page 52.

AN ENGLISH DWELLING AT OVERBROOK, PA.—See page 52.





AN ACTRESS'S HOME AT (IASE, M ee page 53.

A RESIDENCE AT SCRANTON, PA.

We present herewith, on page 48, in this issue, a residence recently erected for Thomas R. Brooks, Esq., at Scranton, Pa. The design is of a unique character, with a stone and brick arched porch entrance, balcony over, tower with lookout, and many other excellent features, combined with a well arranged plan. The archway at front and part of first story are built of pressed red brick with a greenish gray rockfaced stone trimmings The remainder of the building is of wood, with the exterior framework covered with sheathing, paper, and clapboards, and then painted a light gray color with brown trimmings. The gables are paneled and treated in a neat manner. The roof is shingled and painted a deep red. Dimensions: Front, 35 ft; side, 56 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. The vestibule is paneled, and it has a tiled floor. The hall is trimmed with antique oak, and it has a paneled wainscoting and ceiling beams. The grand open staircase with its newel posts extending to ceiling, forming an arcaded effect, with spindle transoms between same, is an excellent feature, together with the stained glass window on first landing, which sheds a soft and pleasant light over upper and lower halls. The pleasant nook at the right of entrance contains a paneled seat, and an open fireplace with tiled hearth and facings, and a mantel of excellent design. The entrance from porte-cochère and the toilet under stairway are conveniences. The floor in this hall is laid with oak and cherry. The parlor is treated with silver and green, and it contains a false fireplace with white and green tiling, and mantel to correspond with trim and finish. The archway with columns between parlor and hall is an attractive feature. The library is trimmed with oak, and it has an open fireplace with tiled trimmings, oak floor, and bookcases built in replete. The sitting-room and dining-room are trimmed also with oak, and the latter is furnished with a buffet built in, with stained glass overwindow, cupboard, and drawers, handsomely carved, and china closets built in either corner with leaded glass doors. This dining-room also has a paneled wainscoting. The kitchen and pantries are trimmed and wainscoted with yellow pine, and each is fitted up with the usual fixtures complete. The second floor is trimmed with poplar, while the doors are of pine. This floor contains four large bedrooms, closets, den, and a large bathroom of unusual size provided with tiled floor and walls, porcelain fixtures, and exposed nickelplated plumbing. The third floor contains two bedrooms and ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Mr. John A. Duckworth, architect, Scranton, Pa.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

ELM PARK METHODIST EPISCOPAL CHURCH AND PARSONAGE, SCRANTON, PA.

The engravings on pages 44, 45, and 46 in this issue illustrate the Elm Park M. E. Church, at Scranton, Pa. The site is a most desirable one, triangular in shape, forming a square, while the church property is the most spacious, adapted to the greatest variety of uses, accoustically the most satisfactory, and without a superior in location and architectural effect. This building has attracted much attention from the unparalleled disasters with which it was visited during the period of its erection. The cornerstone was laid on April 20, 1892, and the first building was practically completed for dedication, which was to have taken place December 12, 1892. On the morning of December 9 the building was destroyed by fire at a total loss. The losses were adjusted and the work of rebuilding commenced at once. This proceeded with such dispatch that the building was inclosed and nearly finished when, on the morning of March 27, 1893, the building was again destroyed by fire. The work of rebuilding was again commenced, and proceeded so energetically as to complete the building for dedication on December 10, 1893. The church was rebuilt on each occasion from the original plans, consequently in its completion and perfection it represents the architect's original conception, and possesses sufficient merit to receive the attention which is given herewith. In this completed building is an organ, pronounced by competent authorities the finest in this country; three memorial windows equal to any, a perfect system of heating and ventilation, and a chime of bells which owing to their relation to the hills and plateaus of the city and the neighboring mountains, produce an effect quite pleasing and unique in its character. Dimensions: Width, 80 ft.; depth, 142 ft., not including piazza or porte-cochère. The building is constructed throughout in a very substantial manner of local rock, with Ohio sandstone trimmings, while the roof is covered with black slate. The style is of the Romanesque order. The entrance porch has clustered columns flanked on either side and the porte-cochère entrance is a good feature. The roof lines of the gables and main roof rise in one graceful sweep up to the massive tower at corner, which adds a dignified and pretentious effect to the whole appearance. The basement contains pastor's study, with open fireplace, trustees' room, ladies' parlor, lecture-room, dining-room and kitchen for entertainment purposes, heating-room, storeroom numerous entrances, coat-rooms and toilet rooms complete. The first floor plan presents the main floor arrangement. The auditorium is planned after the Akron style, and it has a seating capacity of 2,500, including the addition of the Sunday school rooms when thrown together. The interior is finished in cherry, and the altar, pulpit and organ loft and choir are fitted up in a magnificent style and elegantly carved. The galleries are handsomely treated, and are paneled and built in an artistic manner. The walls have a paneled wainscoting of cherry, and the wall space above is treated in yellow, while the ceiling is tinted with yellow and gold. The pews and all furniture are of cherry. The church parlors take in the space at front, with the exception of the space occupied by the two vestibules, and are trimmed with cherry and fitted up with fireplace and mantel. The vestibules and lobbies have tiled floors and paneled wainscotings. The Sunday school room at rear of church auditorium is furnished with private entrances, library, office for the sale of tickets at entertainments, and numerous well-lighted and ventilated classrooms, together with the classrooms on the gallery floor. This church building is as near perfect in its equipments as it is possible for any building of its character. The parsonage adjoining, and of which we present additional views and floor plans on page 46, is treated in a similar style of architecture, and is constructed of similar stone and materials. It has many excellent features, including a spacious piazza, porches, tower and chimneys. Dimensions: Front, 45 ft.; side, 57 ft., not including piazza. Height of ceilings: Cellar, 7 ft; first story, 10 ft.; second, 9 ft.; third, 8 ft. The vestibule has a paneled wall and ceiling and a tiled floor. The hall, of large dimensions, is trimmed with oak. It contains an open fireplace handsomely tiled, and a staircase of excellent design, with newel posts extending to ceiling, and provided with spindle transoms. A square bay-window is thrown out at first landing, which is provided with a cluster of stained glass windows. The side porches are a convenience. The two parlors at front are connected by sliding doors, and each has an open fireplace, trimmed with tiled hearth and carved mantel. These apartments are trimmed with cherry. The library is located conveniently, and also the dining-room, which is provided with a buffet built in a handsome manner. The kitchen and its apartments are wainscoted with narrow beaded stuff, and are furnished with the usual fixtures in the best possible manner. The second floor contains several large bedrooms, with closets and bathroom, the latter furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains three bedrooms and study, besides ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Messrs. Geo. W. Kramer & Co., ecclesiastical architects, No. 1 Madison avenue, New York city, N. Y.

Our engravings were made direct from photographs of the buildings, taken specially for the Scientific American.

AN ENGLISH DWELLING AT OVERBROOK, PA.

We present herewith, on page 50, a residence recently erected for Mr. Smucker, at Overbrook, Pa. The design is treated in the English style, half timber and stone, and is finished with excellent results. The underpinning and first story are built of Chestnut Hill granite, with faces left rough as they came from the quarry. The second story and gables are beamed, forming panels which are coated with plaster work, and left in its natural state. The beams and all woodwork are painted bottle green. The front gable shows some very artistic detail in verge boards. The roof is shingled and left to weather finish. Dimensions: Front, 35 ft; side, 58 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. Vestibule is paneled and beamed with oak, and it forms an entrance to house, the plan of which is most excellently arranged. The main hall, spacious, is trimmed with antique oak, and is provided with ceiling beams, an ornamental staircase, and an open fireplace furnished with tiled hearth and facings, brass trimmings, and mantel. A short flight of stairs leads to toilet, conveniently located under main staircase, and to side porch. The parlor is treated with white and gold in a delicate manner. Library, trimmed with oak, is furnished with bookcases built in, and a pleasant nook with paneled seat and fireplace furnished same as one described. Dining-room is trimmed with oak, and it has a paneled wainscoting and a ribbed ceiling. The floors are of oak, laid in narrow widths and highly polished. Kitchen, laundry, and pantries are wainscoted and trimmed with yellow pine and are fitted up in the best possible manner. The second floor is trimmed with whitewood and treated in colors. This floor contains five bedrooms, ample closets, and bathroom, the latter wainscoted and paved with white English tiling, and furnished with porcelain fixtures and exposed plumbing. The large, open hall is trimmed with antique oak, and is lighted by stained glass windows on staircase, shedding a pleasant light over both upper and lower halls. The third floor contains two bedrooms and a large playroom, which could be used for a billiard-room if desired. Cemented cellar under whole of building contains ample storage. The house is lighted by electricity, and is heated by steam from a central plant controlled by the Overbrook Farms Company. Mr. William L. Price, architect, No. 731 Walnut Street, Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A COTTAGE AT BINGHAMTON, N. Y.

We present herewith in this issue, on page 49, a modern cottage which has been erected recently for G. S. North, Esq., at Binghamton, N. Y. The engravings illustrate a design with many excellent features, good elevations, and well arranged plans. The underpinning is built of rockfaced stone, laid up in a neat manner. The exterior framework is covered with sheathing and paper. The first story is covered with clapboards, and painted colonial yellow, with white trimmings. The second and third stories are partly covered with shingles, while the remaining walls are half timbered, with the spaces filled in with stucco-work painted yellow with white trimmings. The roof is covered with shingles, and left to finish a mottled effect with moss-green stain. Dimensions: Front, 31 ft. 6 in.; side, 48 ft., not including porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second 8 ft.; third, 8 ft. The interior throughout is trimmed with whitewood. The hall contains an ornamental staircase, turned out of sycamore, with a paneled seat at side. The parlor and dining-room are separated by an archway with spindle transom, while the library has an open fireplace with tiled hearth and facings and mantel of handsome design. The dining-room has a false fireplace, trimmed in a similar manner. The kitchen and pantries are wainscoted with narrow beaded stuff, and are provided with all the necessary fixtures of the best improved kind. The second floor contains a den, four bedrooms, large closets and bathroom, the latter wainscoted and fitted up with porcelain fixtures and exposed plumbing. Third floor contains ample storage and space for rooms if desired. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost, $3,200 complete. Mr. Elfred Bartoo, architect, Binghamton, N. Y.

Our engravings were made direct from photographs of the building taken specially for the Scientific American.

A MODERN COTTAGE AT NYACK, N. Y.

We illustrate, on page 47, a modern cottage recently erected for the Rev. Edward Mitchell, at Nyack, N. Y. The design is unique for a small modern cottage, and it has good plans first-class construction, and is built at a low cost. The underpinning is built of brick. The first story is clapboarded, and painted colonial yellow, with white trimmings, while second and third stories are covered with shingles, painted a yellowish brown, with similar trimmings. The roof is shingled and finished natural. Dimensions: Front, 26 ft.; side, 30 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with yellow pine and finished natural. The hall contains an ornamental staircase with turned newels, balusters, and rail, and also a paneled seat. The parlor is provided with hardwood mantel, and the dining-room contains a nook for buffet and door to porch. Kitchen is wainscoted with narrow beaded stuff, and is fitted up replete. The second floor contains three bedrooms, closets, den or study, and bathroom; the latter being wainscoted and furnished complete with the usual fixtures, and exposed plumbing. The third floor contains one bedroom in tower and trunk room. Cemented cellar is provided with furnace, laundry, and other necessary apartments. Cost $2,500, including furnace and everything replete. Mr. George Francis Morse, architect, Nyack N. Y.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODERN VILLA AT CHESTNUT HILL, MASS.

We present herewith, on page 41, in this issue, a modern suburban villa, which has been erected for Messrs. Merriam, Isenbeck & Alvord, at Chestnut Hill, Mass. The design is treated in the modern American style, with colonial detail, and it combines many excellent features, including the covered and uncovered porches, baywindows and window seats, latticed window effects, and plans which present an excellent interior arrangement. The underpinning is built of rockfaced field-stone laid up at random. The superstructure is covered with sheathing, paper, and then shingles. It is stained a greenish and brown color, with mottled effect, and it harmonizes nicely with the white trimmings and the shingled roof, which is finished natural. Dimensions: Front, 52 ft.; side, 31 ft. 6 in., not including porch. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft.; second, 9 ft.; third, 8 ft 6 in. The hall is treated in a most artistic manner. It is trimmed with whitewood and treated in china white, and it has a paneled wainscoting five feet in height, and a heavy wood cornice. There is also a nook at right of lobby, with paneled seats. The staircase hall is separated from hall proper with columns of colonial design rising to ceiling. The stairs have newel posts, balusters and rail turned out of whitewood in a neat and dainty manner, and are treated with china white. The fireplace has a tiled hearth and facings and mantel. The

parlor is treated with china white, and it has a paneled wainscoting, and also a fireplace trimmed with tiles and mantel. The library is trimmed with whitewood. It has a floor of maple, paneled wainscoting, and an open fireplace, with the usual trimmings, tiled hearth, facings, and mantel. The dining-room is trimmed with oak, and it has an oak floor, paneled wainscot, oak cornice, and a buffet built in and carved in a neat manner. Kitchen and pantries are trimmed and wainscoted with yellow pine, and each apartment is fitted up in the most improved manner. The second floor is treated in white. It contains five bedrooms, large closets and bathroom, the latter wainscoted and furnished with the usual fixtures (porcelain) and exposed plumbing. The third floor contains two bedrooms, billiard room and storage. Cemented cellar contains furnace, laundry and other necessary apartments. Mr. J. H. Morse, architect, No. 8 Exchange Place, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT BINGHAMTON, N. Y.

We present on page 42, in this issue, a residence recently completed for Miss Q. M. French, at Binghamton, N. Y. The engravings present a very attractive design, with excellent elevations, clean cut in their style, with fine details, some features of which include the well-shaded piazza, bay windows, heavily moulded cornice, and latticed window effects. The underpinning is built of rockfaced ashlar bluestone. The superstructure above, of wood, is covered with sheathing, paper, and clapboards, and is painted yellow, with ivory white trimmings. The roof is covered with shingles, and left to finish a mottled effect, with moss green stain. Dimensions: Front, 30 ft.; side, 47 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The hall is trimmed with oak, and it has an oak floor. It contains an ornamental staircase with turned newels, posts, balusters and rail, and is lighted by a stained glass window. The parlor is separated by columns, with carved capitals, supporting arch. It is trimmed with oak, and it has an open fireplace built of brick, with hearth and facings of tiles, and a mantel of oak. The library is trimmed with cherry, and the dining-room with cypress, the latter containing a nook for buffet. Kitchen, pantries, and rear hall are trimmed and wainscoted with yellow pine, and are furnished with the usual fixtures complete. The second floor is treated in colors, and it contains a den, four bedrooms, closets, and bathroom, the latter wainscoted and fitted up with porcelain fixtures and exposed nickelplated plumbing. The third floor is not finished, with the exception of ample space for storage. Several rooms could be provided on this floor if desired. Cemented cellar under whole of building contains furnace, laundry, and other necessary apartments.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

AN ACTRESS'S HOME AT CHEVY CHASE, MD.

On page 51, we present views and floor-plans illustrating the residence of Miss Annie Lewis, at Chevy Chase, a suburb of Washington, D. C. The elevations, though not distinctive in style, are unique in treatment, a well-shaded corner porch, with shingled piers, supporting roof above, paneled space in front, and broad expanse of roof, relieved only by the dormer windows, are the principal exterior features of the design. Underpinning and first story of rough red brick, with the introduction of narrow moulded strips, painted light brown, and fastened to rafters; structure above is covered with rough plaster, tinted red; the roof is shingled and stained green; shingles, except where noted, stained burnt sienna; trimming color, dark reddish brown; blinds and lattice painted dark green. Chimneys of brick, corbeled, but uncapped. Dimensions: Front, 29 ft. 10 in.; side, 38 ft. 4 in. Heights: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; attic, 8 ft. The plan shows a convenient arrangement of rooms; entrance door, which is five-paneled and has side-lights, opens directly on the large reception hall, with fireplace and hearth of brick under stairs at farthest end; mantel shelf above. Staircase of easy rise, having square, ornamental newel with cap and turned balusters, leads to landing, with seat, in overhanging bay; finish, natural ash. Music-room, in cream, has angle red-brick fireplace with ornate mantel above. Wide opening to dining-room in ash, octagonal in form; angle fireplace has mantel shelf above; recess for buffet and china closet. Butler's pantry contains dresser, with drawers, sink, etc. Kitchen furnished with usual fixtures. Second floor is divided into five chambers, all with closets, servants', linen and bathroom, with usual fixtures. Cellar, cemented, contains laundry, heating apparatus, fuel storage, etc. Louis D. Meline, Esq., architect, Chevy Chase, Md.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

Exterior Plaster for Dwellings.

The traveler in the Province of Ontario and in some other parts of Canada cannot fail to notice the stuccoed walls of many of the older houses, which, although of wooden construction, appear like solid masonry, and have the advantages of cheapness, efficient protection from the rigorous climate, and economy in construction with common materials by ordinary labor. Ordinary siding of a frame house is furred out and lathed and plastered on the outside, the surface being colored to suit, and thickly strewn with small pebbles set in the wet plaster. With proper repairs this surface can be maintained in a neat and attractive condition, and promotes the warmth of the house, while it saves the necessity of painting; but if allowed to become dilapidated the appearance is very bad, says the *Engineering Record*. The method of applying this rough-cast surface is to first cover the sheathing with two crossed layers of diagonal lath three inches centre to centre, well nailed, and then plastered with two coats of rich lime mortar with plenty of cow's hair, mixed at least four days before using, and well pressed into the key spaces. After it has well dried the first coat is thoroughly dampened and the second coat applied, and the rough-cast immediately thrown on its surface. The rough-cast is composed of washed fine gravel mixed to a creamy consistency with pure lime. This is thrown on with a wooden float and immediately brushed with a whitewash brush. One hundred yards of rough-cast requires 1,800 laths, 12 bushels of lime, 1½ barrels best cow's hair, 1¾ yards of sand, ¾ yard of gravel mixed with ¼ yard of lime putty, and 16 pounds of cut lath-nails, 1¼ inches long.

Rules for Making Good Mortar.

Mortar for the plasterer's use should be well made, and the following rules should be strictly complied with when making:

First—The lime should be thoroughly slaked, and brought to a paste or putty state.

Second—It should remain in the mortar bed until it is perfectly cool before mixing in the sand and hair.

Third—Good mortar may be used with safety eight or ten days after it is made, but in no case should it be used before it is six days old.

Some authorities say it is best to use mortar for plastering within three or four days after it is first made. They claim that, in mortar which stands ten or more days before using, the lime loses a portion of its strength, and the mortar becomes deteriorated thereby. This, to a certain extent, is true; but, notwithstanding the loss of strength by the lime, and the consequent deterioration of the mortar, every observant plasterer knows that walls coated with mortar made two or three weeks previous to using stand better than those coated with "green" or freshly made mortar. Newly made mortar, immediately applied, frequently causes the walls to chip, crack, and become mottled. Mortar well tempered, and as well seasoned, works better and cooler than the hastily made new mortar, and invariably gives better satisfaction. Colonel Gillmore, quoting from Vicat, and apparently indorsing the statement, says: "It was supposed, for many years, that the longer the lime was slaked before it was used the better mortar it would make. Recent experiments prove, however, that this is not the case with mixtures of fat lime and sand only. Better results are obtained with such mortars if the paste be mixed with the sand as soon as the slaked lime has become cold, and care should be taken to use no more water, in the process of extinction, than may be required to produce a thick pulp."

In slaking lime, care should be taken that neither too much nor too little water is used. If too much is used, the lime will be "chilled," and lose a part of its strength; if too little, it will "burn," and a portion of it will pass into the bed unslaked and cause trouble there.

As the quality of lime varies in different localities, it is impossible to give the exact proportion of sand to be used to each bushel of lime.

The hair should be mixed with the lime and sand at once, for mortar should never be wet up a second time. For the first coat on lath it will be necessary to use about two pounds of hair to every bushel of lime slaked, and the mortar should have only a sufficiency of sand in it to keep it from cracking while setting, as it requires to be "pasty" enough to stick firmly to the lath and "clinch" or "bond" securely between and behind them.

In many places the plasterer has also to lath the work he is to finish; when such is the case, he should make it a rule never to have more than ⅜ of an inch key between each lath. Joints should be broken every sixteen inches, and more frequently if the conditions will admit. If twenty or thirty laths are nailed so that the ends all joint on one stud, it will soon show itself, as the plaster will certainly crack at that point when the studs dry and shrink. In lathing for outside work, if the building has been first boarded, it is better to nail the lath on diagonally—say at an angle of about 45 degrees to the base of the building, and one inch apart; then cross these lath again at right angles with another tier, nailing them on to the first lath, leaving spaces about three-fourths of an inch between them.

This method of lathing is a trifle more expensive (about one-fifth) than the ordinary way, but it insures good work, and if the frame of a house is well put together and firm, so that the wind will not rack it, the plastering will stand longer than either clapboards or siding for outside work. This method of lathing is extensively adopted in the Province of Quebec, Canada, and the Maritime Provinces, and when a little rye whiskey is used in the making of the mortar—say about one gallon to every twenty bushels of lime, into which it is thoroughly mixed—much strength and durability will be added. Many buildings which are known to have been plastered more than fifty years ago are as good now as when the work was first completed, where these precautions were adopted.—*The National Builder*.

Premature Occupation of New Houses: A Test for Relative Humidity of Habitable Apartments.

Regarding newly built houses, sanitarians, for the most part, teach us that a period of four months in summer and six in winter ought to be allowed between the end of the building operations and the entrance of the inhabitants into a house. In this way will be avoided the accidents that arise from the premature occupation of an apartment. It is scarcely necessary to add that, as soon as the house has begun to be occupied, to avoid dampness it should be heated and ventilated; treated, in a word, by all the usual means to maintain a healthy condition of the apartment. If the dampness persists in spite of all these precautions, the proprietor is responsible for the defects in his building. Physicians are sometimes requested to estimate the relative dampness of an apartment or room. This is not always easy by simple inspection, as a room may be damp although saltpetre does not grow on its walls or mould in its corners. The following is an exact means of appreciation, and one that is within every one's scope: In the room in question a kilogramme of fresh lime should be placed, after hermetically closing doors and windows. In twenty-four hours it should be weighed, and if the lime has absorbed more than ten grains of water (that is, more than one per cent.) the room should be considered damp and classed as unhealthy. The question of dampness of dwellings is a frequent cause of dispute between landlord and tenant, naturally solved in the affirmative by the latter, and in the negative by the former. The question can be settled in the future by the test of the hydration of lime of which I have just spoken, and which will give irrefutable proof or refutation of the validity of such complaint. The dampness of dwellings is a cause of illness. The death rate is greater in quarters where the apartments are damp than where they are dry. Ventilation is defective where the walls are impregnated with water; the porosity of the walls is done away with, and can only be re-established after the evaporation of the water has been completed, and the heat required to effect this evaporation is furnished by the person living in the room. This is the cause of the vivid impression of cold which we experience in damp places, and it is a well-known fact that exposure to the action of the cold renders the organism more accessible to the attack of morbid germs. The rotting of walls, which appears particularly in places where the water used in building contained nitrates and chlorides, is caused by changes from dryness to dampness and *vice versa*. It gives rise to fragmentation of the mortar, and even of the building stones themselves. Finally, frost can split a wall that is soaked in moisture. The dampness of dwellings is due to internal or external causes. There can be no doubt that a new building ought to be treated for a certain length of time by ventilation and heat, with a view to evaporating the enormous amount of water incorporated with the building materials. According to Pettenkofer, a three-story house requiring 167,000 bricks would need some 835,000 litres of water to build. When this evaporation has been effected great care should be taken in insuring proper drainage for rain and other water.—*Journal American Medical Association*.

Ventilation of Apartments.

Regarding the influence of the size of the room on ventilation, Prof. Carpenter is quoted by a leading English heating journal as follows: "The purity of the air of a room depends to some extent on the proportion of its cubic capacity to the number of inmates. This influence is often overestimated, and even in a large room if no fresh air be supplied the atmosphere will quickly fall below the standard of purity. It must be considered that no room is hermetically sealed. Ventilation takes place through every crack and cranny, and even by diffusion through the walls of the room. Such ventilation is generally, however, uncertain and inadequate. Large rooms have the advantage over small ones in that they act as reservoirs of air, and also because there is chance for intermittent ventilation such as occurs when doors or windows are opened, and for the casual ventilation which takes place through the walls and around the windows. They are also advantageous, because a larger volume of air may be introduced with less danger or producing disagreeable air currents or draughts."

Does Your Faucet Leak?

A chemist, who measured exactly the amount of waste, found that about 50 drops fell every minute; within 90 minutes there would be 4,500 drops of water, which is equivalent to a quart, so that there would be a loss of four gallons of water every 24 hours. In a year almost 1,500 gallons of water will have been wasted uselessly from a leaking faucet.—*The American Builder*.

A NEW RECORDING THERMOMETER.

The illustration represents an instrument which has been developed to meet a demand for a recording thermometer for atmospheric ranges of temperature that can

Fig. 1.

BRISTOL'S NEW ATMOSPHERIC RANGE RECORDING THERMOMETER FOR CLOSED SPACES.

be applied to air, gases, or liquids in a closed pipe or room. Fig. 1 shows the complete instrument, which consists of a Bristol recording pressure gauge, in which the helical tube is completely filled with an expansible liquid. This tube, which is sensitive to and is operated by changes of temperature, is inclosed in the cylinder projecting from the back of the case of the recorder. This cylinder protecting the sensitive tube is furnished with a screw thread, so that it may be conveniently located within a gas main, through the side of a tank, or through partition of a

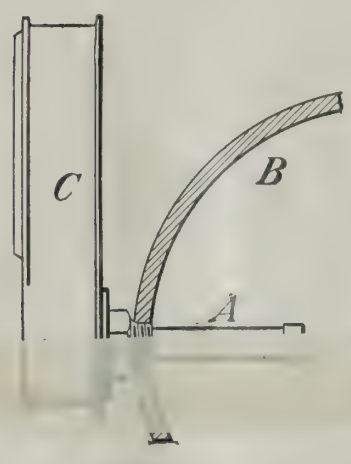


Fig. 2.

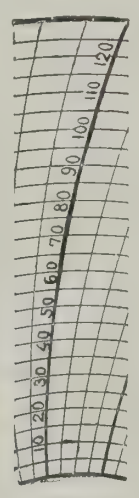


Fig. 3.

BRISTOL'S RECORDING THERMOMETER.

room, as may be desired. Fig. 2 is an illustrative outline of one of the thermometers as applied to a large gas main, *A* representing the protected sensitive tube ; *B*, a cross section of gas main, and *C*, the recording portion of the instrument.

It will be observed that the operative part of the thermometer is entirely protected from any action of the gases or liquids of which the temperature is being recorded, hence the operation of the instrument is absolutely independent of the pressure or vacuum within the closed space.

Fig. 3 shows a specimen section of the chart of these instruments for a range from 0° to 130° Fahrenheit.

Other ranges may be made by using weaker or stronger pressure gauge tubes. By varying the quantity of expansible liquid inclosed in the pressure tube, the lower end of the scale may be limited and a very open scale provided at the normal degree of temperature. These instruments have been in successful operation for several months. They are being manufactured and placed on the market by the Bristol Company, of Waterbury, Conn.

THE Kewanee Boiler Company, of Kewanee, Ill., have opened a storeroom at No. 102 North Tenth Street, St. Louis, Mo., where they carry a full line of samples of all of their steam and hot water heating boilers. This branch is in charge of Mr. J. F. Burrows. The company are manufacturers of "Haxtun" boilers for steam and hot water heating, Tabasco hot water heaters, tubular boilers, tanks, smoke stacks, breechings, boiler fronts, and all kinds of shell work.

Beautiful Work in Wood Finishing.

The Bridgeport Wood Finishing Company, of New Milford, Conn., have recently issued, more especially for the use of architects, a specimen book containing samples of different woods finished with the Wheeler wood filler and the Breinig stains, which is something quite remarkable in the way of catalogue work. The book contains forty-eight specimens of oak, mahogany, cherry, cypress, maple, whitewood, sycamore, curly birch, pine, ash, etc., mounted on heavy cardboard, their finely finished surfaces protected by layers of soft cotton, and all showing the great beauty which can be developed in clearly bringing out the natural grain of a wood and finishing it with a high polish, which the materials furnished by this company render entirely practicable. The samples given are but a small percentage of the kinds of wood on which these finishes are applied, but the book forms a volume almost as large as a dictionary.

Slate Roofs.

"Slate Roofs" is the title of an interesting and highly instructive little book published by the Bangor Excelsior Slate Company, of Easton, Pa., and which the company send to those interested who write for it. The book has reached its third edition. It tells what slate is and how roofing slate is made ; how slate is shipped and how put on the roof, the tools used, etc. The Bangor Excelsior quarries are located on the famous old Bangor vein, and contain the finest beds of roofing slate that have been discovered. The company operate ten derricks, the largest number operated by any quarry in this famous region, and keep a large stock of the various sizes constantly on hand. The slate from these quarries goes to all parts of the United States and abroad, and the owners refer with confidence to their numerous customers as to the character of the goods shipped and the care with which orders are filled.

DEC-CO-RE-O.

A very useful invention of late years for decorative and building purposes is Dec-co-re-o, devised and patented by Hall & Garrison, of Philadelphia, Pa. The nature of the material is such that it can be utilized for numerous purposes of decoration in the building and furnishing of a house, and, once placed in position, will last as long as the building itself. As it has long passed the experimental stage, the above prediction is fully warranted.

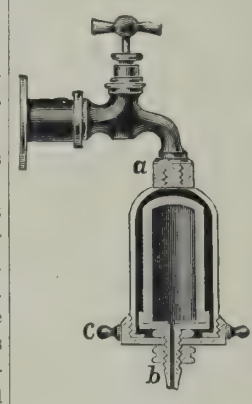
It is applicable for grilles over doors and windows, stair balustrades, for partitions for desks and bank railings, for constructing cozy corners in rooms, for elaborate ceiling and wall decorations, and any imaginable decorative purpose in the construction and furnishing of a home, as it can be worked into any form and shape suitable to any purpose. Any unsightly large opening in a building can be, by a Dec-co-re-o Grille, with pole and curtain attached, turned into a feature of great beauty, and the endless variety of ornamental lines removes at once the monotony and tiresome effect produced by spindles or other automatic machine work. Large rooms have been divided in two by a beautifully designed grille in Dec-co-re-o with a curtain underneath, and stores have been partitioned off with it to suit the requirements of the working force. A music-room can be partitioned off from the parlor with a Dec-co-re-o Grille and curtain, as may be required, and more successfully than with any other material or effect. It is also applicable to steamship work, and makes a most beautiful decoration when applied in this manner. All of the grilles for transoms, and other portions of the fine steamships St. Paul and St. Louis, were made of this Dec-co-re-o, and furnished by Hall & Garrison to the International Steamship Co. direct, and they received the highest praise from the company, the builders, and the architects for the magnificent work that they had furnished, and for the beautiful effect it gave to the boats

Its durability is derived from the construction of its base, which is a thin board composed of a number of very thin layers of hardwood, glued firmly together cross-grained, which insures an indestructible material for that purpose. On this base, plastic ornaments are cemented either on one side or on both sides, as may be required ; the wood remaining between the ornaments is then removed, thereby forming a plastic perforated carved grille of any design desired, either carved only on one side or both sides, as the case requires.

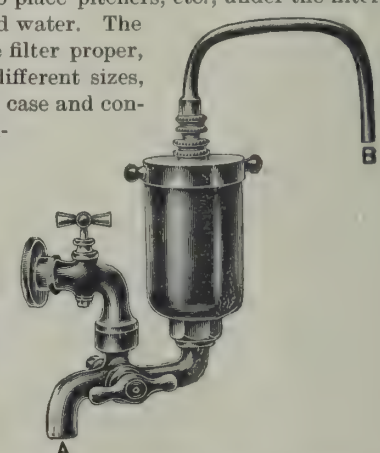
Messrs. Hall & Garrison also manufacture plastic ornaments for interior decoration on canvas, which can be pasted, cemented, or glued into position by any paperhanger or carpenter, besides mouldings for picture frames in endless variety, and in this line they have been the leaders for many years past. They also are large contractors for wood finish in houses, and the Chelsea and Central Park Flats, Holland House, and Belgravia, in New York ; Geo. W. Childs' Mansion at Bryn Mawr ; Jas. P. Scott's house, and Hotel Walton, at Philadelphia ; Baltimore & Ohio R. R. Building at Baltimore ; Shoreham at Washington, and United States Building at Harrisburg, besides numerous other buildings all over the country, are monuments of their skill in these lines.

THE BERKEFELD FILTER.

A filter which will absolutely remove all impurities from the water, and at the same time operate rapidly enough to be practically applicable to the ordinary household supply faucet, without too greatly delaying the flow, presents the first elements of merit, the further most essential, practical matter being that such a filter can be readily cleaned and kept in a state of original efficiency. Such a filter, the Berkefeld Filter Company, (August Giese, Prop.), 4 Cedar street, New York, claim to offer. The first cut shows a Berkefeld Filter attached to an ordinary water faucet. This filter is neatly nickelplated and especially designed to be screwed to any regular ¾-inch hose bib faucet of the main supply pipe, as shown in cut. When the water is turned on, it is forced through the walls of the filtering cylinder within, leaving all impurities, even typhoid and cholera bacilli, and other objectionable matter, on the surface of the same. As soon as the filter stops running, the bottom part is unscrewed, to which the cylinder is attached, and the dirt which has accumulated on the cylinder removed with a soft brush. After this the cylinder is replaced, and filter will work as well as before.



This filter gives a gallon of filtered water in three to four minutes by ordinary pressure of forty pounds. Length is 6 inches ; diameter, 2¼ inches. Cut No. 2 represents the filter in connection with a two-way water cock, filtration upward, for which an extra outlet pipe for filtered water, as shown in the cut, is needed. This style is recommended in houses where the supply faucet is located too low to place pitchers, etc., under the filter to collect the filtered water. The filter cylinder, or the filter proper, is made in several different sizes, with inclosing metal case and connections for attachment to the house supply service, the filter cylinder in the small illustration being 3½ inches high and of 2 inches outside diameter. The prime merit of this filter lies in the peculiar quality of the filtering cylinder, which is made of infusorial earth from the kieselguhr mines of Hanover, Germany, composed of minute skeletons of diatomaceæ, and having an enormous number of exceedingly small pores, designed to intercept the flow of the minutest suspended organic or inorganic matter, while their hard silicious nature affords a firm and practically indestructible material. The pores are so minute as to be practically impassable by the minute germs which develop into the organisms causing putrefaction, fermentations, and the various zymotic diseases, and yet the filter may be easily cleaned, ordinarily by simply brushing off the surface of the filtering cylinder, or it may be thoroughly sterilized by being boiled in water, being gradually brought to the boiling point. The capacity of a single cylinder small filter is a gallon of filtered water in three minutes at a pressure of forty pounds, equal to about ninety feet head, and at other pressures in proportion.



The Berkefeld Filter has been tested and recommended by scientists all over the world, such as Dr. R. Koch, Berlin ; Profs. M. Gruber, H. Nordtmeyer, H. Bitter, Breslau ; Percy I. Frankland, Dundee ; Drs. G. Simms Woodhead and G. E. Cartwright Wood, London. It is in use and recommended by the United States War Department, the New York and Brooklyn Boards of Health.

A DEC-CO-RE-O GRILLE.

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THE

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THE OVERPRODUCTION OF TALL OFFICE BUILDINGS.

There are not wanting signs that the erection of lofty office buildings in New York city has been carried to a point, in regard to both their size and number, where the supply has overtaken the demand, and, indeed, to some degree, has anticipated it.

More than one New York daily journal has recently drawn attention to the fact that one of the most common signs to be seen hung out in the lower city is that of "offices to le'," and there are not wanting other evidences that the rapid erection of these enormous structures will be checked, as the result of the very numbers in which they are being built. While it is true that the oversupply may be largely attributed to the prevailing dullness of trade, it is chiefly the result of the enormous number of first-class offices which have been opened for renting during the present year.

The history of the tall building boom in New York is confined to the present decade, and presents points of special interest. There is no centre of business in any of the great cities of the world which is so cramped by the site upon which it is built as is the lower part of New York city, lying between the City Hall Park and the Battery. Here stood the original city, and the location within it of the Custom House, City Hall, and the Treasury, with its concentration of banks, brokers' offices, and insurance houses, has enabled this locality to maintain its standing to this day as the most important commercial centre of New York city. Compared with the magnitude of the interests which are represented within its borders, its area is extremely limited, and as a consequence there has been an appreciation in the value of land to which it would be difficult to find a parallel in any of the great cities of the world. As an instance of this, it may be mentioned that the lot upon which the Manhattan Life Insurance building stands was purchased for $157.02 per square foot; that the site for the American Surety building cost from $176 to $282 per square foot, and as far back as the year 1882 as high as $330 per square foot was paid for a piece of ground located at the southwest corner of Wall and Broad streets. It can readily be understood that at the ordinary rate of office rentals it would require the erection of a structure many stories in height to pay merely the interest on this enormous land value; but above this building must be raised another stretch of stories to pay the interest on the cost of the building itself, and above these again must be other stories whose rental shall pay the operating expenses, such as lighting, heating, water supply, in addition to insurance and taxes.

It is likely, moreover, that the increased size of the buildings has reacted upon the price of real estate, and that, while increased ground values have led to lofty buildings, the lofty building itself has tended to increase the price of real estate. During the past five or six years New York has seen a veritable boom in the building of lofty office buildings, and the more thoughtful and far-seeing among the real estate agents have been asking themselves how soon the time would come when these structures would be a glut upon the market. In the course of an exhaustive article upon this subject, which quotes the opinions of several leading real estate agents in the city, the New York *Sun* shows that not only are the buildings themselves but partly filled, but they have been emptying many of the old but very excellent office buildings which were formerly the most popular of their kind in the city. A list of the taller office buildings is published, which shows that there are 127 such structures to be found between Houston street and the Battery, a distance of about a mile and three-quarters. An estimate which we ourselves made during the autumn of last year, showed that at that time there were over ninety buildings between City Hall Park and the Battery, of eight stories high and upward, and that nearly all of these were of the latest composite construction.

In all these buildings combined we found that there was a total floor space above the seventh story level of eighty-eight acres; and it must be remembered that during the past twelve months construction has been commenced upon several new buildings, and that plans for others have been filed in the Building Department. As an instance of the increased floor space afforded by these new buildings over the old five and six story buildings, the huge structure which has recently been opened at Bowling Green may be quoted. The plot of land upon which this stands occupies over 26,000 square feet, and is made up of a dozen separate twenty-five foot lots. It is estimated that if these twelve lots carried twelve buildings of the old style, they would have accommodated but seventy-two office tenants, since without elevators no good tenants could have been placed higher than the third floor; the upper floors of the building, if they were five or six stories high, would in all probability have been used for lofts. Now the present building holds no less than 1,020 offices, or fourteen times as many as could have been provided for under the old system of construction. Instead of a daily population of about 300 persons, it can accommodate about 3,500. It was to have been expected that with such increased accommodations there would be a reduction in office rentals; and this has actually taken place, the reduction in many cases amounting to as much as 50 or even 60 per cent. as compared with that paid for offices which are adjoining or in the near neighborhood. Considered as an investment, the office building is not what it used to be, and where an interest of 10 per cent. or over was formerly not uncommon, to-day a renting agent is well satisfied if he can figure out that the building under his charge is paying 6 per cent. to the owner. As to the future, there is every reason to believe that returning prosperity and the natural increase of the population and business of the city will render the tall office building as profitable an investment as the older buildings have been in the years gone by. While there may be a temporary check to their rapid multiplication, it is certain that in the future, unless they are subjected to legislative restrictions, they will continue to be built and find tenants as they do to-day.

A MODERN DWELLING AT PROHIBITION PARK, STATEN ISLAND.

We present herewith, on page 65, a modern dwelling which has been erected recently for Mr. Albert Wadhams, at Prohibition Park, Staten Island. The engravings present an attractive model for a suburban dwelling, combining not only pleasing elevations with well arranged plans, but also a price which is below the usual cost. The underpinning is built of brick, covered with cement and lined. The building above is covered on the exterior with clapboards and painted light gray, with white trimmings. The gables are covered with shingles and stained sienna. The roof is shingled and left to finish natural. Dimensions: Front, 34 ft.; side, 44 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with cypress. The hall contains an ornamental stairway turned out of oak. The parlor, library, and dining-room are good sized, and are connected. The library has an open fireplace, trimmed with tiles, and mantel. The kitchen is wainscoted and fitted up with the usual fixtures, hearth for range, dresser, sink, wash trays, etc. The second floor contains four bedrooms, closets, servant's room, and bathroom; the latter is wainscoted and fitted up with the usual fixtures and exposed plumbing. There are no rooms finished off on third floor, but several rooms could be provided if desired. Cellar contains furnace and other necessary apartments. Cost, $3,000, complete. Mr. John Winans, architect and builder, Prohibition Park, Staten Island.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT CHEVY CHASE, MD.

The subject of illustration on page 66 is the cottage of L. D. Meline, Esq., at Chevy Chase, Md., a suburb of Washington, D. C. The views show a design simple in treatment and pleasing in appearance, first story being of red brick with headers stained deeper, structure above covered with plaster tinted yellow, except in gable, which are gray; roof is covered with green slate, trimming color being white. Dimensions: Front, 41 ft.; side, 29 ft., exclusive of porches. Heights: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; attic, 8 ft. Chimneys of red brick with corbeled caps. The porches have Tuscan columns supporting the balconies above at side and gabled roof at entrance; centre dormer-window relieves the roof lines. The floor plans show a centre hall, 8 ft. wide, with rounded arch supported by two columns to parlor, having angle fireplace of red brick with ornamental mantel above; parlor and hall walls covered with terra cotta cartridge paper, dining-room being in pale green tint. This room also has fireplace with brick arch and ornate mantel above, corner china closet feature, and double sliding doors to hall; butler's pantry, with sink and dresser, and passage with backstairs leads to kitchen; complete, with usual fixtures, including dresser, sink and wash trays. Stairs of ash, have straight string, square paneled newel, with decorative cap and turned balusters. Second floor is divided into four chambers, all with closet accommodations, and two with fireplaces, linen closet and bathroom, containing usual fixtures of good make. Three rooms finished off in attic. Cellar, cemented, contains heating apparatus, fuel, storage, etc.; general finish throughout, white pine, painted. The house was erected under the personal supervision of the architect, L. D. Meline, Esq., Chevy Chase, Md.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

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CONCERNING COLONIAL ARCHITECTURE IN NEW YORK.

The present revival in favor of the once popular colonial architecture, calls our attention more than ever to the few remaining examples of that style. At the beginning of this century the entire country of the thirteen original States was covered with excellent models of this style, but since the Civil War these have been rapidly disappearing, until there are only a few here and there, and these widely scattered. Some have fallen apart from neglect and decay, while others have been swallowed in the great demand for improved houses of more modern architectural style. In a city like New York, when every few years we make another sacrifice of old buildings to the gods of economy, space and acquirement of wealth, it is strange that there should be any pure examples of original colonial architecture still remaining, nevertheless there are a few left.

Accompanying this paper are two cuts: each represents such examples as have been suggested above. On the small square at the beginning of Broadway, known as Bowling Green, stretching from Whitehall Street on the east to State Street on the west, is a row of buildings, now occupied by European steamship offices. Historically, these buildings are situated on the site of Fort Amsterdam, erected by the Dutch in 1626, and within whose walls the first substantial church was erected. Immediately following the Revolutionary War, in 1787, the fort was demolished, and the Government House built in its place. The buildings occupying the site at present were erected in the first decade of this century, and the newels illustrated in the cut are a part of the railings around these buildings.

On the dividing line of each piece of property are railings thirty feet long, which probably connected at one time with a railing extending the whole length of the row, but which is no longer there. At the street end of each of these railings is a newel as illustrated. The railings that adjoin Whitehall and State streets are more elaborately ornamented with newel lights (per cut). These are probably the best example of colonial wrought iron work found in this neighborhood, and as such alone are worthy of some study.

The neighborhood was, at the time of the erection of these buildings, the most fashionable residential section of the city. From these houses, before the erection of the elevated roads in Battery Park, a magnificent view of the upper bay and vicinity could be had to Battery Park. The fashionable promenade of the city made them the more desirable.

The other cut represents a more general class of colonial work, of which there is still quite some remaining. These colonial doorways are found on old houses in the old Knickerbocker portions of the city. Some can still be seen in the old Greenwich Village, in the neighborhood of West Fourteenth to Christopher street. There are a number of doorways very much like the one in the cut, on the site of the old Stuyvesant farm, which lay in the neighborhood from Great Jones to East Sixteenth streets. The doorway herewith illustrated is on a house on Fifth Street, between Second and Third avenues.

HENRY RAUSCH.

A RESIDENCE AT PROHIBITION PARK, STATEN ISLAND, N. Y.

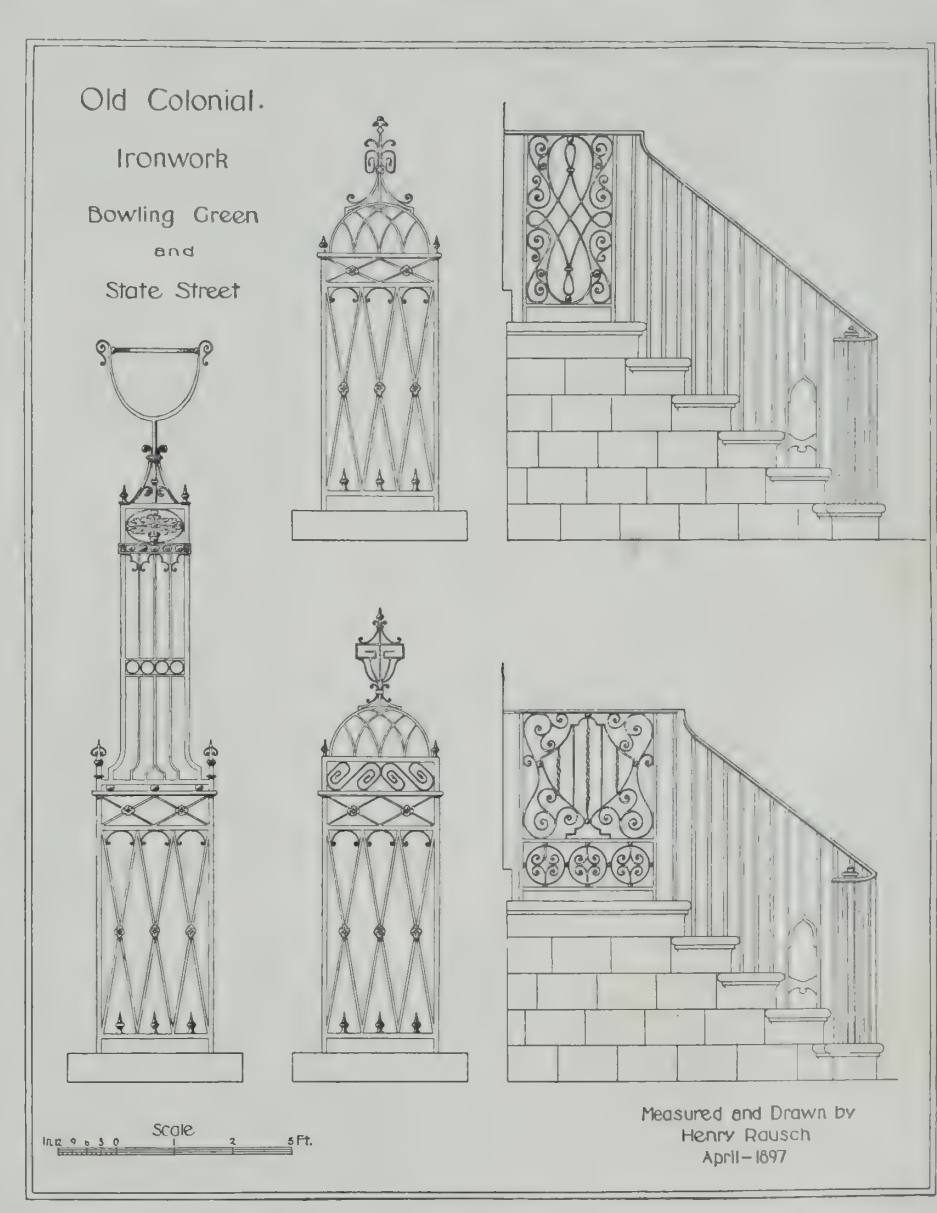
We present herewith, in this issue, on page 67, a residence recently erected for Frank Burt, Esq., at Prohibition Park, Staten Island. The engravings present an attractive design, with many excellent features, including the piazza, well shaded, octagonal projections, and bay-windows. The underpinning and first story are built of rockfaced Warsaw bluestone of a soft grayish-blue color; the second and third stories are covered with shingles, and stained a dark mahogany color. The columns at front porch are of dressed New Hampshire granite. The roof is covered with shingles. Dimensions: Front, 48 ft.; side, 54 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The vestibule is paneled with quartered oak, and it is provided with a mosaic tiled floor, and glass doors running to floor. The reception hall and staircase hall are trimmed with quartered oak, and they have paneled wainscotings and parquet floors. The nook has a paneled divan, and the archways separating same, and both halls, are provided with ornamental spindle transoms. The grand staircase has massive, carved newel posts, turned balusters and rail. At first landing there is a spacious nook, provided with a cluster of stained glass windows. There are many bits of fine stained glass work throughout the house. Under the stairway is provided a den, trimmed with oak and furnished with paneled wainscot, divan running around same, and an open fireplace, with wrought iron trimmings and tiled facings and hearth. The fireplace in hall has a mosaic tiled hearth and facings, wrought iron trimmings, and mantel with columns and mirror. The gas fixtures are goldplated and of very handsome design and exquisite workmanship; the remaining gas fixtures in the other principal rooms are of a similar character. The parlor is trimmed with white mahogany, and it contains an open fireplace, with tiled hearth and facings, and a massive carved mantel, with fluted columns and Ionic capitals. The library is trimmed with black walnut. It has a parquet floor, paneled wainscoting, bookcases built in, and an open fireplace. The dining-room is a very handsome apartment, and it is trimmed with white mahogany, and is fitted up with a paneled wainscoting, parquet floor, a buffet built in and handsomely carved, and a mantel similar to the one in parlor. The rear hall, toilet, and ice box are conveniently located. The kitchen is trimmed and wainscoted with yellow pine, and is provided with large pantries and the usual necessary fixtures. The second and third floors are trimmed with yellow pine. The second floor contains six bedrooms, eight closets, and bathroom; the latter wainscoted and furnished with porcelain fixtures and exposed plumbing, all silver-plated. The third floor contains one bedroom, trunk room, and other storage space. Cemented cellar contains laundry, furnace and store room, coal cellars, and other necessary apartments. Mr. John H. Coxhead, architect, Buffalo, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

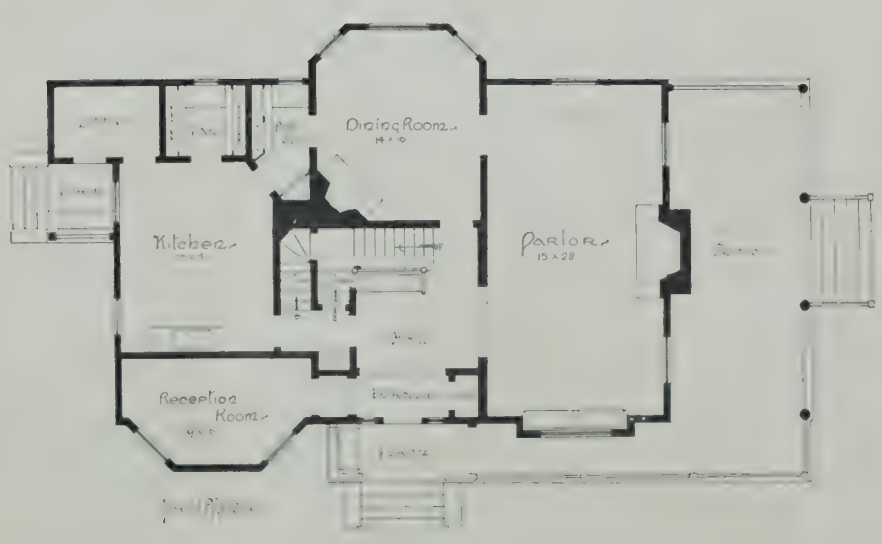
A MODERN RESIDENCE AT RICHMOND HILL, L. I.

We present herewith in this issue, on page 59, a modern residence which has been erected for Mr. Roth, at Richmond Hill, L. I. The engravings present a design with many excellent features, including tower, baywindows and piazza. The underpinning is built of rockfaced stone laid up in a neat manner. The superstructure, of wood, is covered with clapboards on first story and shingles on second and third stories. It is painted a deep Indian red with white trimmings. The roof is shingled and finished in their natural state. Dimensions: Front, 33 ft. 6 in.: side, 39 ft. exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second 9 ft.; third, 8 ft. 6 in. The first and second floors are trimmed with whitewood, some of which is treated in colors, while the remainder is finished natural. The vestibule has a tiled floor. The main hall contains an ornamental staircase with turned newels, balusters and rail, and an open fireplace trimmed with tiled hearths and facings, and mantel of hardwood. The reception-room is treated in china white. The parlor has a false fireplace with tiled facings and hearth and hardwood mantel. The dining-room has an octagonal projection at side, and it has also a large china closet and butler's closet, with dresser, etc. The kitchen is trimmed and wainscoted with North Carolina pine and provided with the usual fixtures. The second floor contains four bedrooms, large closets and bathroom, the latter wainscoted and provided with the usual fixtures and exposed plumbing. The third floor is trimmed with North Carolina pine finished natural, and it contains two bedrooms and ample storage. Cemented cellar, contains furnace, laundry and other necessary apartments. Cost $5,500 complete. Mr. H. E. Haugaard, architect, the Long Island Mill and Construction Company, Richmond Hill, L. I.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.



OLD COLONIAL IRONWORK.



A SUMMER COTTAGE AT MANCHESTER-BY-THE-SEA, MASS.—See page 70.

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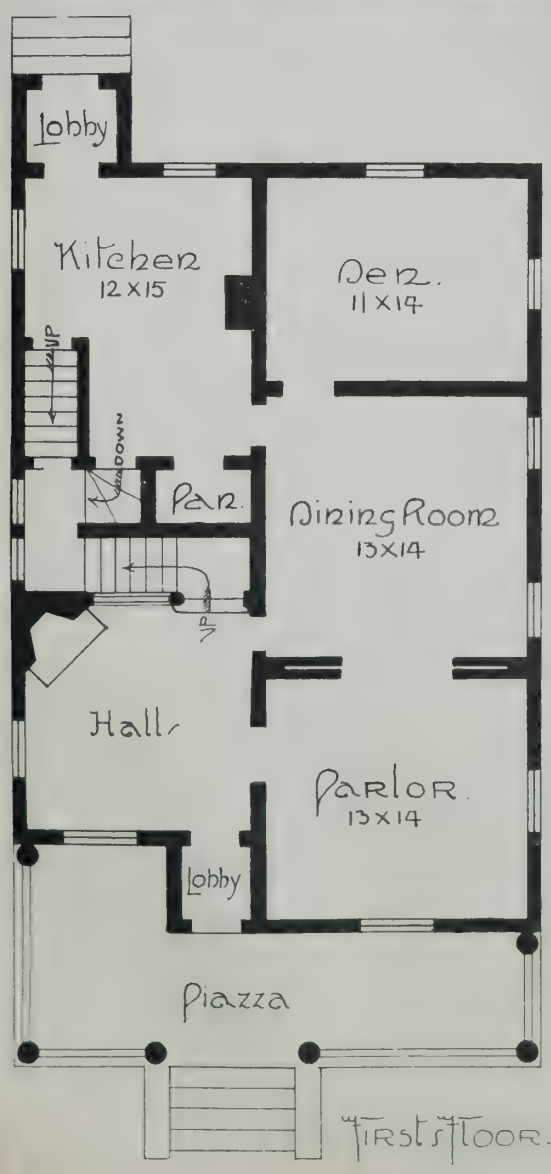
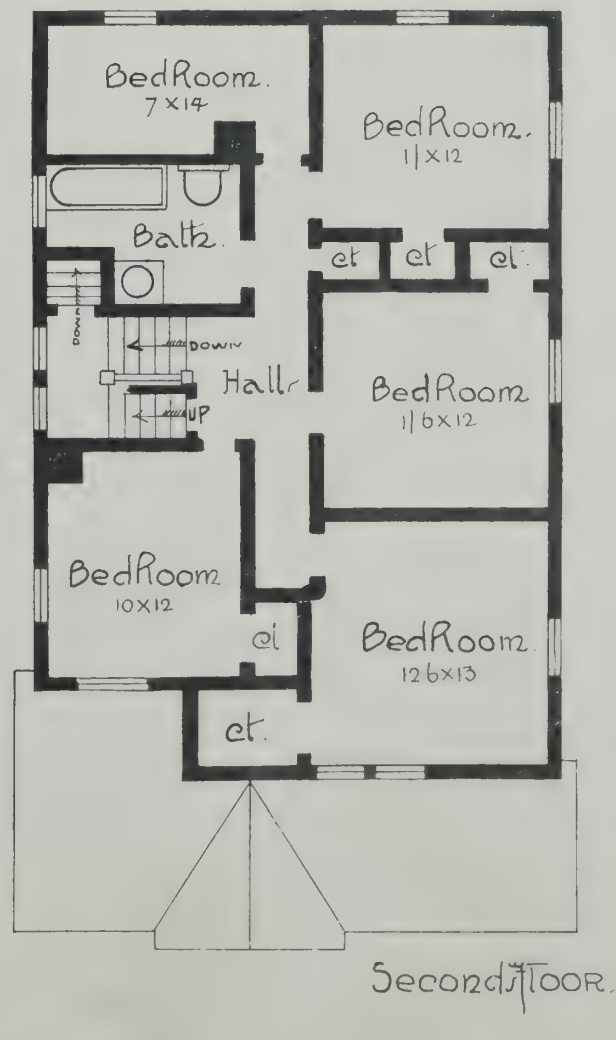
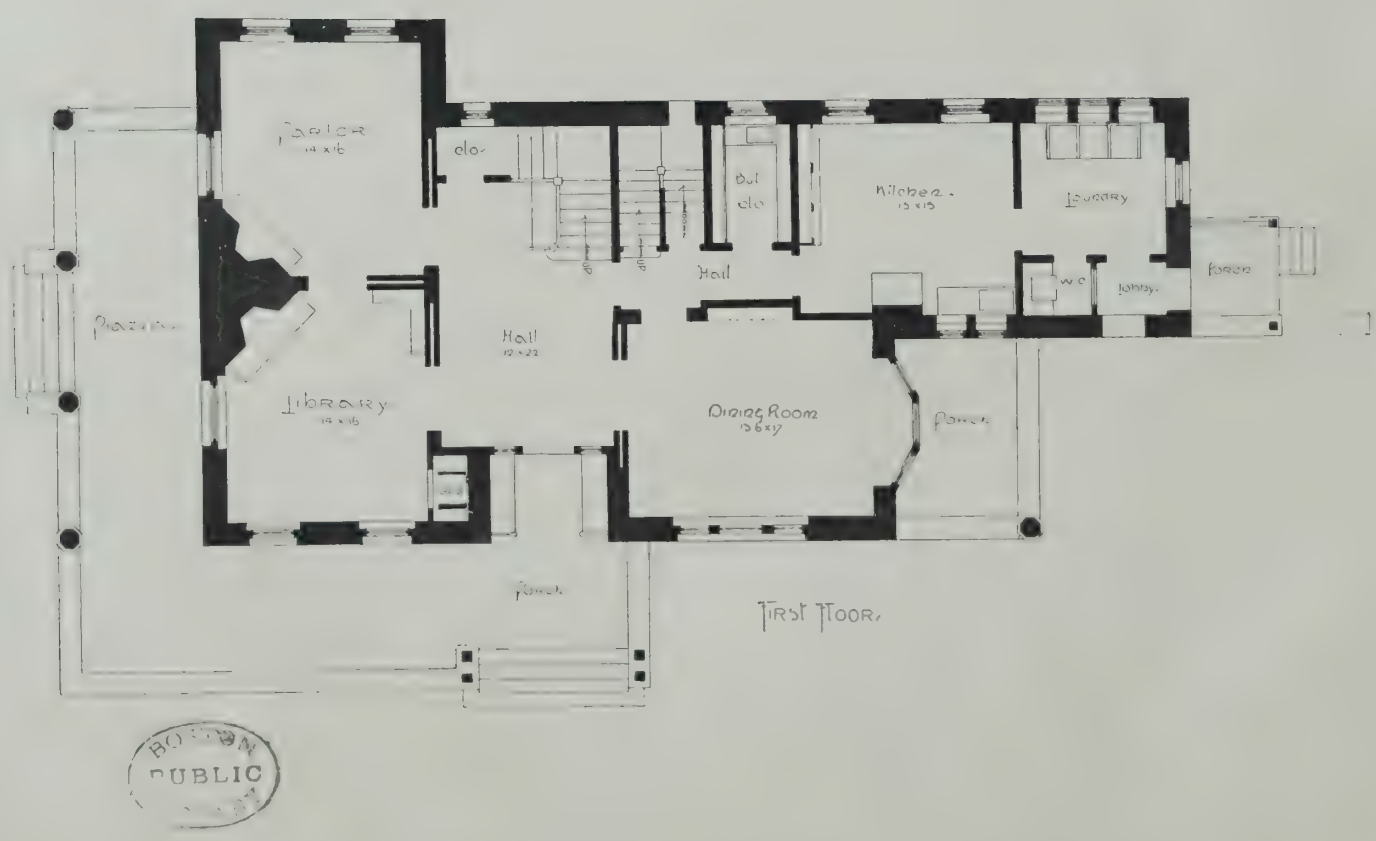
A MODERN RESIDENCE AT RICHMOND HILL, L. I.—See page 57.

A RESIDENCE AT MONTCLAIR, N. J.—See page 69.



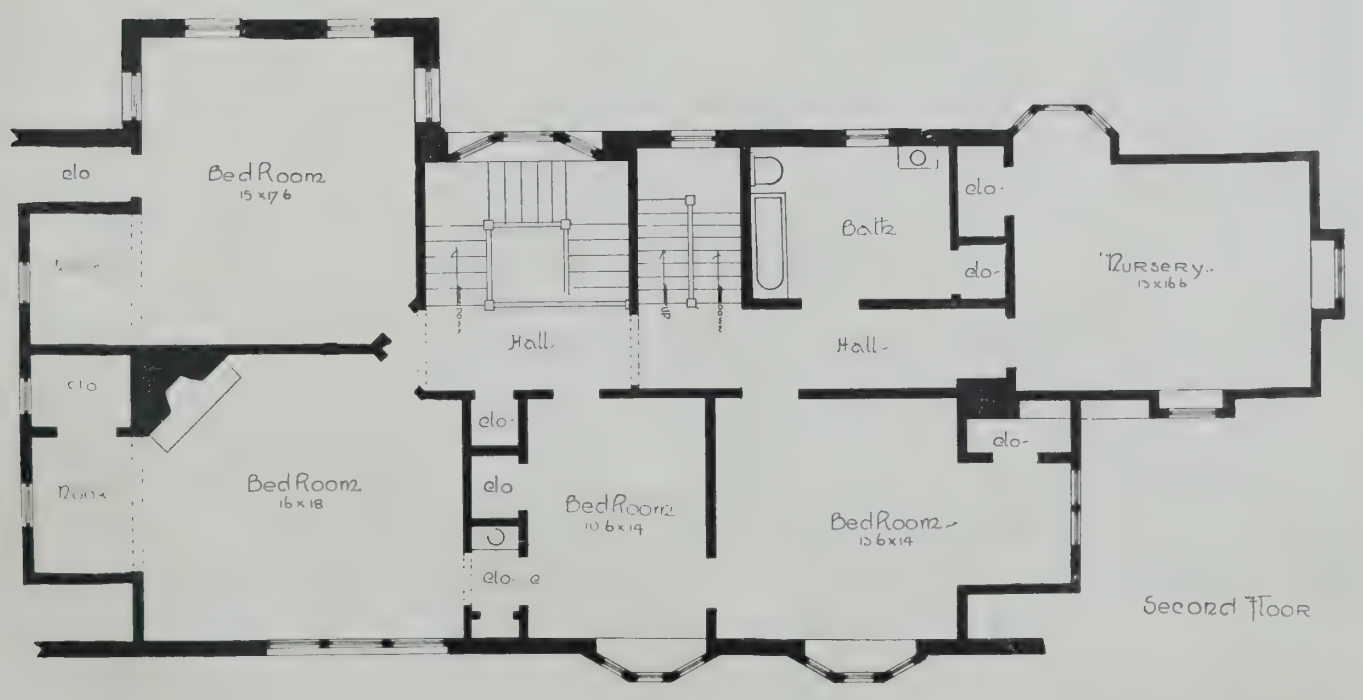


SOME MODERN HOUSES AT BINGHAMTON, N. Y.—See page 70.

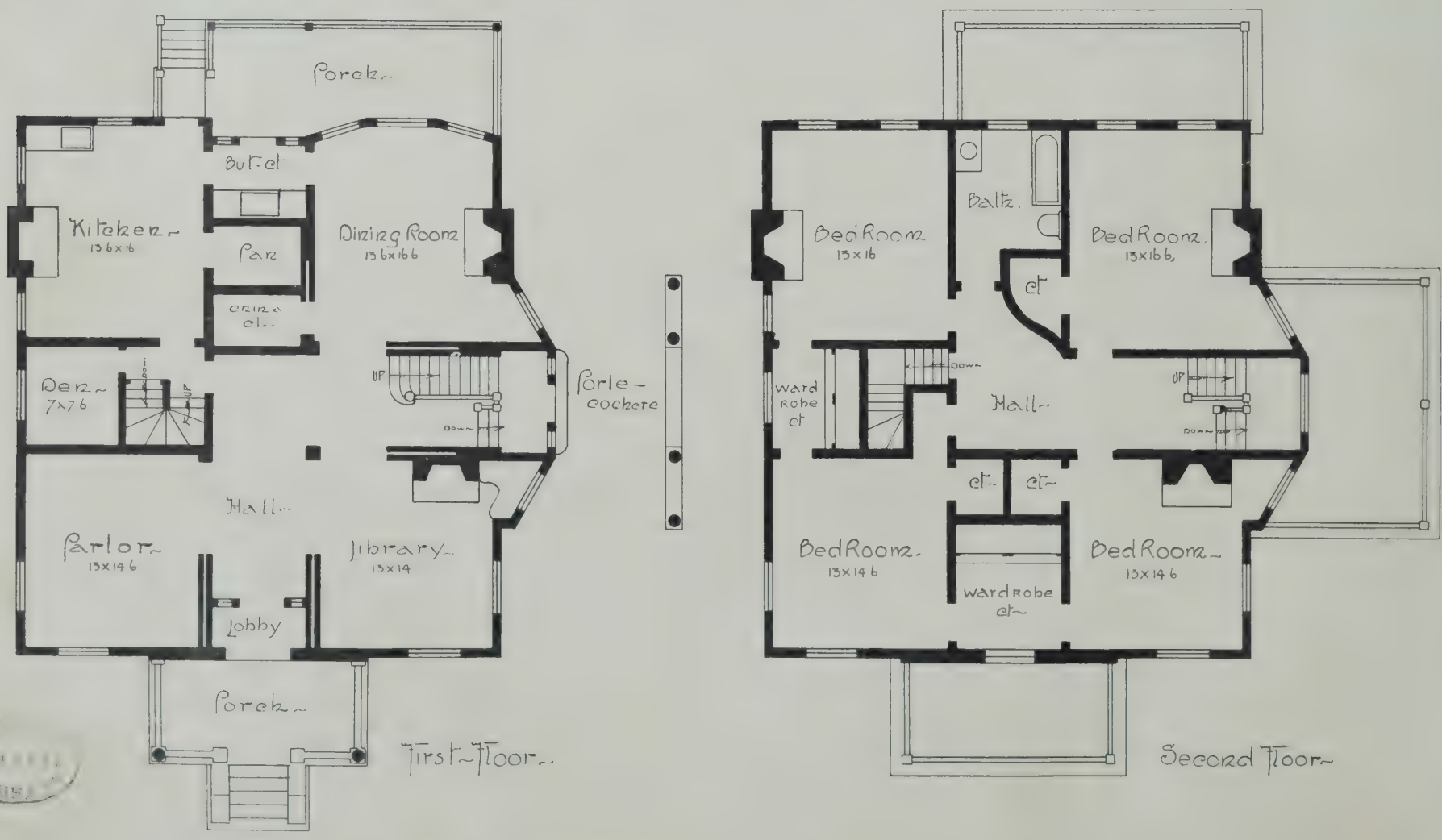


BOSTON PUBLIC

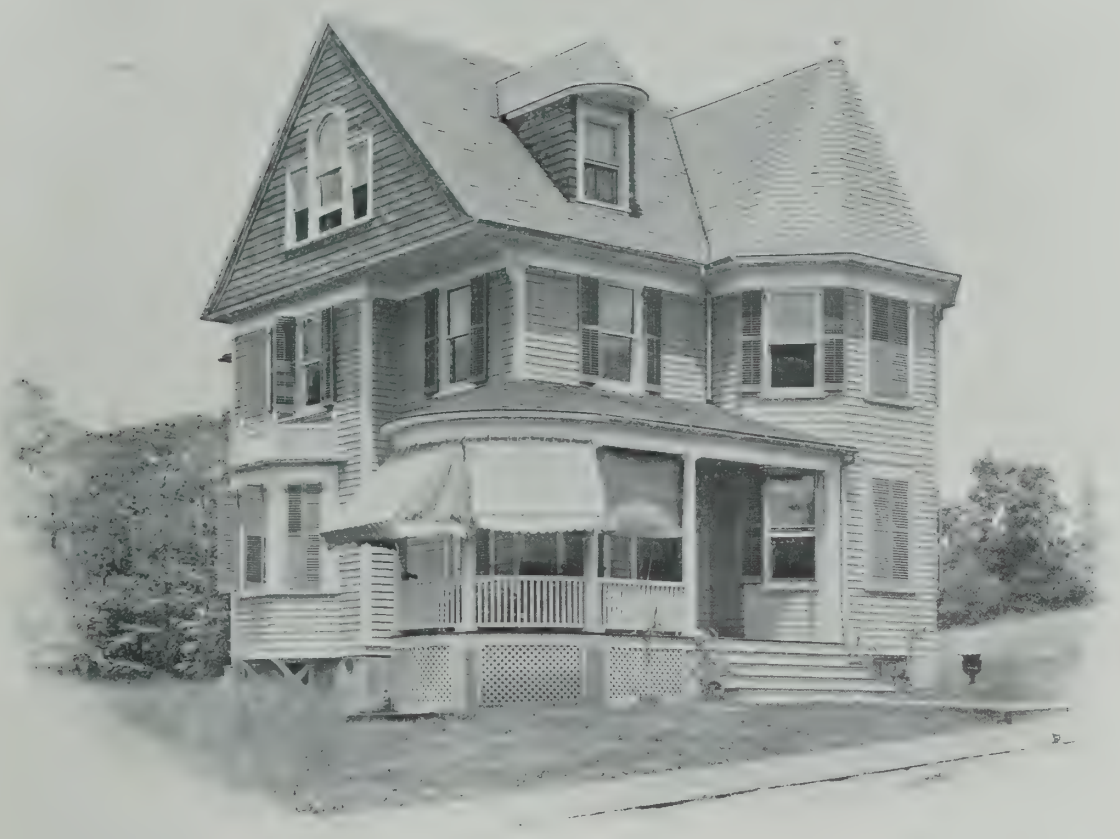
A SUBURBAN RESIDENCE AT OVERBROOK, PA.—See page 69.



A SUBURBAN RESIDENCE AT OVERBROOK, PA.—See page 69.



A SUBURBAN DWELLING AT NEWARK, N. J.—See page 69.



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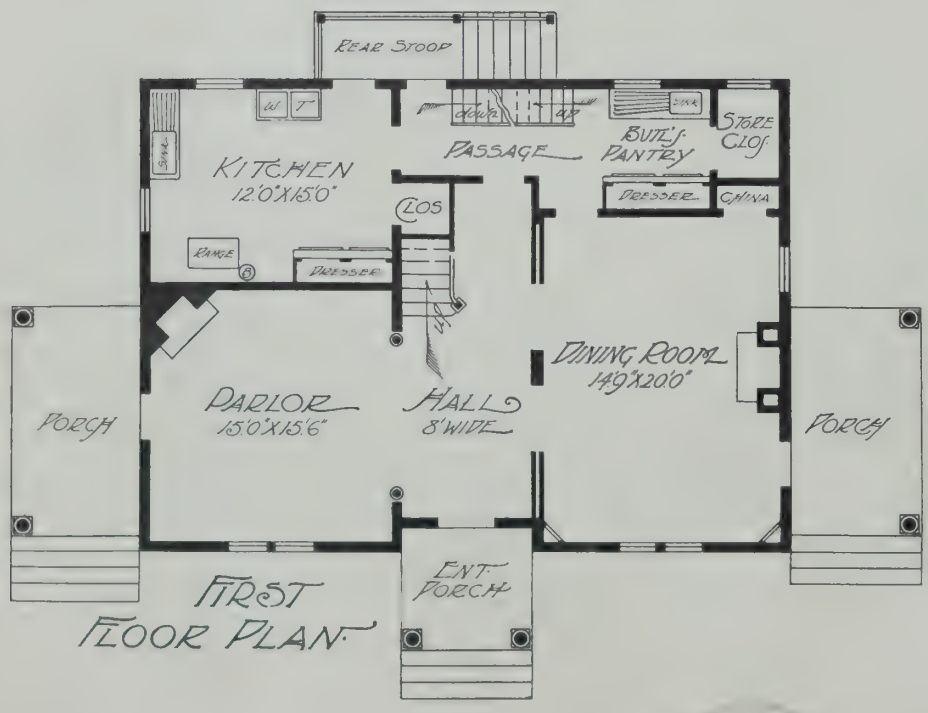
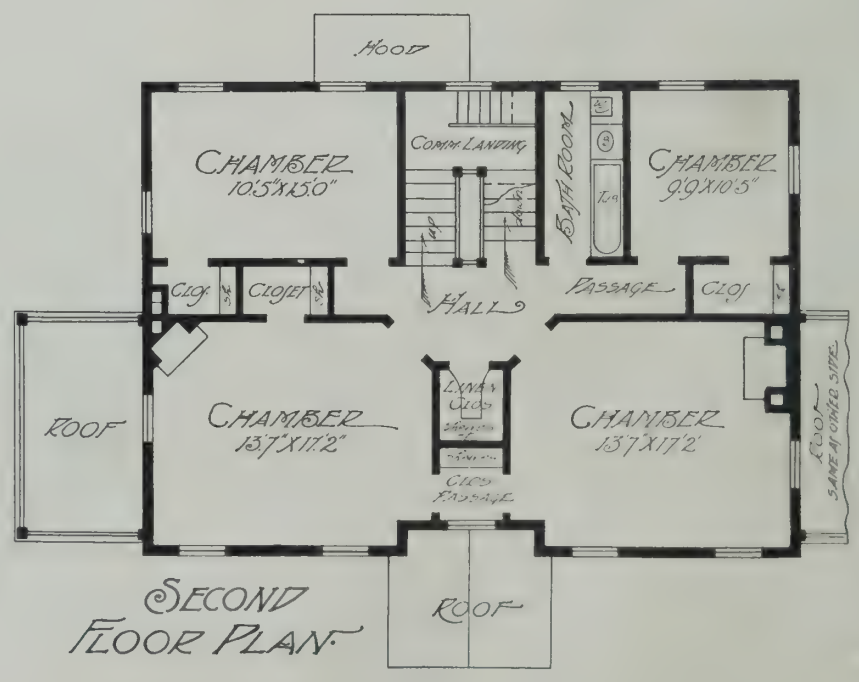
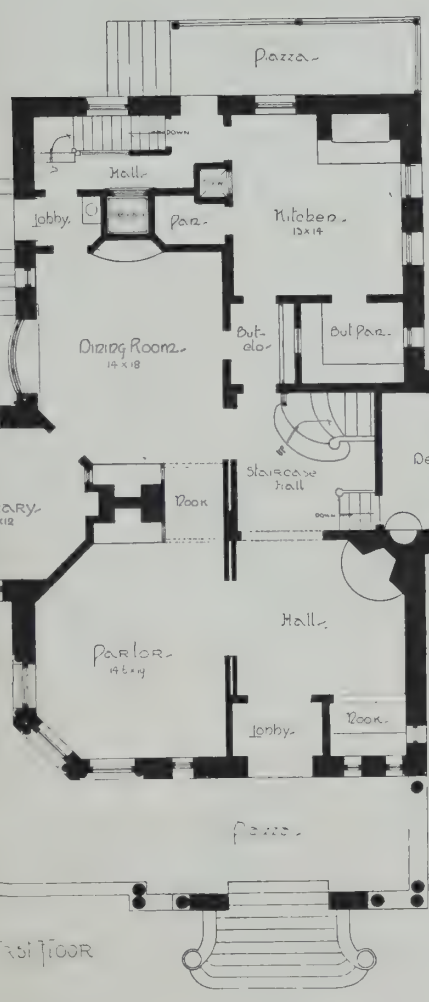
A MODERN DWELLING AT PROHIBITION PARK, STATEN ISLAND.—See page 56.





A COTTAGE AT CHEVY CHASE, MD.—See page 56.



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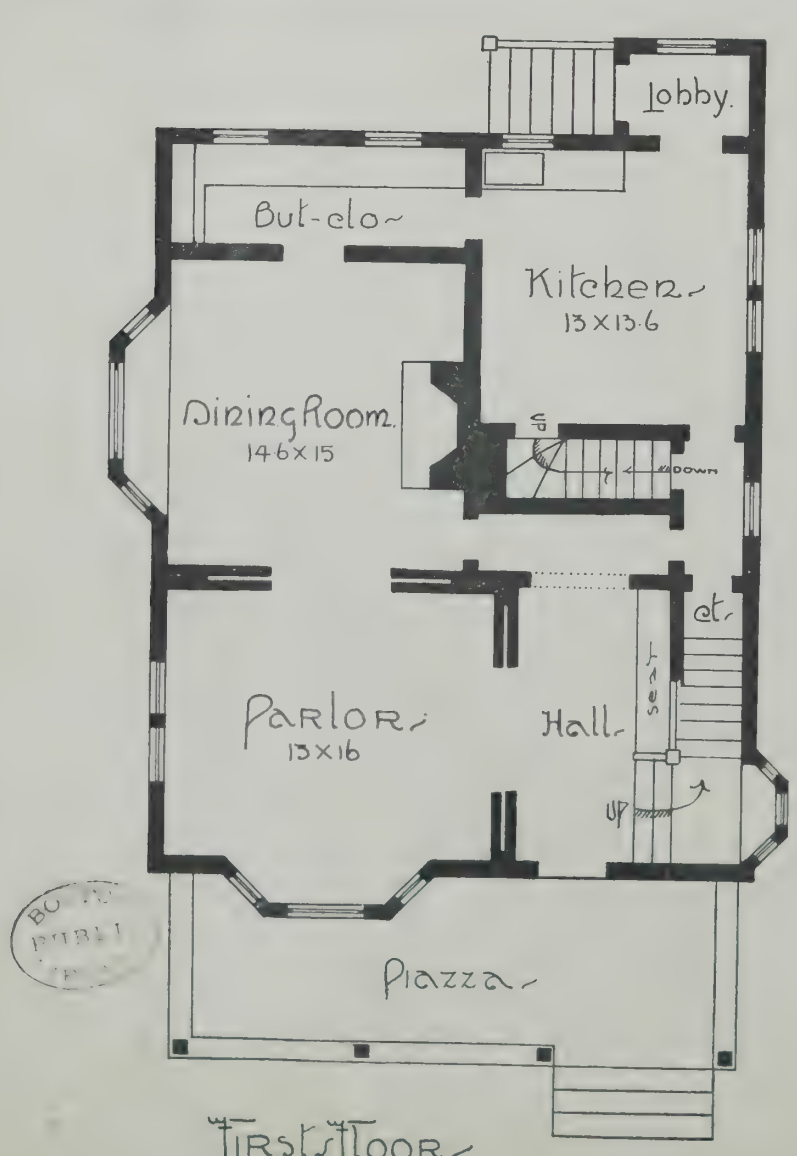
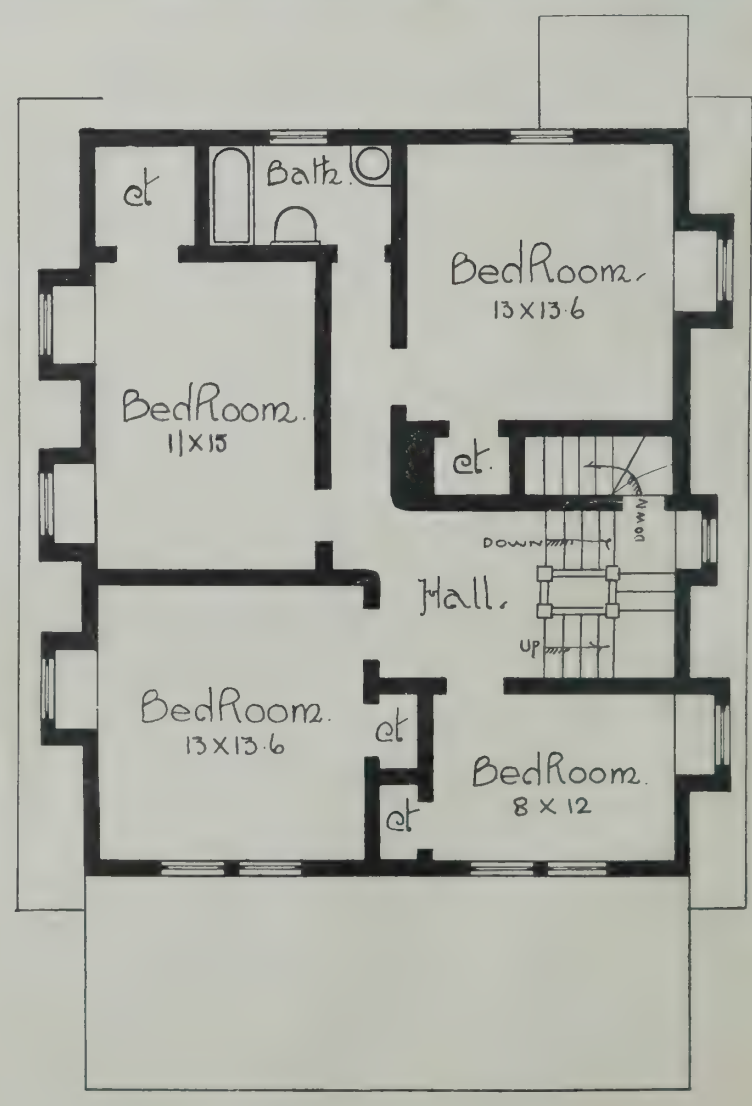
A RESIDENCE AT PROHIBITION PARK, STATEN ISLAND.—See page 57.





A GAMBREL ROOF COTTAGE AT NEWTON CENTRE, MASS.—See page 70.

CORCORAN ART GALLERY, WASHINGTON, D. C.

We present below and on page 55 exterior views of the Corcoran Art Gallery, at Washington, D. C., and which has been erected from the designs of Mr. Ernest Flagg, architect, Mills Building, 35 Wall Street, New York City, N. Y. The new building occupies the entire block between New York Avenue and E Street, and it faces east, overlooking the Government Reservation at the rear of the President's home and just below the War and State departments; from this point of view upward of two miles of park, at east end of which is the Capitol, the dome being plainly seen in the distance. The dimensions of the building are: 265 ft. on Seventeenth Street, 310 ft. on New York Avenue, and 290 ft. on E Street. The heights of ceilings are 12 ft., 20 ft., and 26 ft. respectively. The building is treated in the modern Greek style of architecture, and it consists of a main *corps de bâtiment* in the form of a long rectangle occupying the centre of the lot on Seventeenth Street. On one side a wing extends along E Street, and on the other side along New York Avenue and Seventeenth Street. As the site forms an acute angle, the corner of the building has been rounded off to avoid disagreeable lines. The main portion of the building rises somewhat above the wings, as seen in the photographs presented. The basement is constructed of granite, boldly rusticated with a projecting batter. The remaining two stories are built of white marble. In the centre of the first story is the main doorway of the main edifice, which has a massive architrave, sheltered by a cornice and a richly sculptured tympanum, the door itself of oak, with deep caissons, and overlaid with bronze plates. On either side of the doorway are placed bronze lions, after those by Canova on the tomb of Clement XIII., in St. Peter's, at Rome. On both sides the walls are pierced by five windows, spaced at equal intervals. The cornice of the story above contains the galleries, strengthened by the broad pilasters of Antæ, to which are fastened, about two-thirds their height, bronze shields with branches of palms and laurel. Between these Antæ, for a limit of two-thirds the height of the story, the wall is composed of blocks of marble of equal size, and is unbroken and without ornamentation, save of the "Corcoran Art Gallery," cut in great letters about four feet in height. In the remaining third of the height, that part between the bottom of the main entablature and the plain wall surface alluded to, extends a long row of square openings, in which are inserted claustra cut out of the solid marble. Above each of the pilasters is a bracket supporting the main architrave of the building. In the frieze are inscribed the names of the most eminent artists. The cornice is bold and massive, and is crowned with a rich cheneau, or gutter, in bronze. The roof is hipped, and is of copper, with a bronze ridge, finished at either end with winged griffins seated.

(To be continued.)

CORCORAN ART GALLERY, WASHINGTON, D. C.

A RESIDENCE AT MONTCLAIR, N. J.

We present herewith, in this issue, on page 60, a residence which has been erected for Isaac Newton Rudges, Esq., at Montclair, N. J. The design is of the colonial treatment, and it has many excellent features, good lines and a spacious piazza. The underpinning, built of buff brick, is carried up to the level of window sills; the superstructure, of wood, is covered on the exterior with clapboards and painted colonial yellow with ivory white trimmings. The roof is shingled and treated in its natural state. Dimensions: Front, 38 ft.; side, 48 ft., not including piazza. Height of ceilings: cellar, 7 ft.; first story, 10 ft. 6 in.; second, 9 ft. 6 in.; third, 8 ft. 6 in. The vestibule is paneled in oak and it has a tiled floor, laid up in mosaic style. The main hall is a spacious one, and is trimmed with oak. It contains a paneled wainscoting and an open fireplace with tiled facings and hearth, and a massive oak mantel with mirror and Corinthian columns extending to ceiling. The grand open staircase is built of oak, and it has spindle balusters and a baywindow thrown out at landing, and provided with stained glass windows. The parlor is treated in white and gold, while the library is trimmed with oak, and is separated from hall by a cluster of columns standing on a paneled base and rising to ceiling. This library has also a paneled wainscoting, and an open fireplace with tiled trimmings and mantel with bookcase and paneled seat on either side. The dining-room is circular in form, and is very unique in its treatment of china closets and fireplace. It is trimmed with oak and has a paneled wainscoting. The kitchen and pantries are trimmed with yellow pine and finished natural, while the apartments are provided with the usual fixtures. The floors of the principal rooms have hardwood (oak) floors laid in narrow widths and highly polished. The second floor is trimmed with white pine, and it contains five bedrooms, eight closets, dressing room and bathroom. The latter is wainscoted and furnished with the usual porcelain fixtures and exposed nickelplated plumbing. The third floor contains three bedrooms and ample storage. Cemented cellar contains laundry, furnace, cold storage room, and other necessary apartments. Cost, $10,000 complete. Mr. Christopher Myers, architect, 361 Broadway, New York.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A SUBURBAN RESIDENCE AT OVERBROOK, PA.

We present as one of the subjects for this issue, on pages 62 and 63, a very attractive residence which has been erected for Charles Scott, Esq., at Overbrook, Pa. The design is treated in the English style, half stone and timber, with handsomely cut verge boards at gables, and many other excellent features. The underpinning and first story are constructed of rockfaced stone from the Chestnut Hill quarries, of a soft grayish color. The second story and gables are beamed, painted bottle green, while the spaces between are filled in with plaster work and painted a light yellow. The roofs are covered with slates. Dimensions: Front, 68 ft; side, 36 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The vestibule has paneled seats on either side of a broad, open doorway, with windows at side of same. The hall is trimmed with oak, and it has a paneled wainscoting, ceiling beams, and a grand staircase handsomely carved and turned out of similar wood, with seat at side, and a baywindow thrown out at landing and glazed with delicate tinted stained glass. The parlor is trimmed with birch, while the library is trimmed with oak. Both have open fireplaces fitted up with tiled hearth and facings and mantels to correspond with trim. The library is also provided with bookcases built in. The dining-room has a nook for buffet, and is trimmed with oak. It has a baywindow at end with a cluster of windows, one of which runs to floor and opens out upon porch. The rear hall, kitchen and laundry are wainscoted, and each apartment is fitted up in the best possible manner. The second floor is trimmed with white pine, and it contains four large bedrooms, nursery and bathroom, the latter being fitted up with tiled wainscoting, paved floor, porcelain fixtures and exposed plumbing. There are three bedrooms on third floor, besides ample storage. Cemented cellar under whole of house, contains the necessary apartments. The house is heated from a central plant. Mr. William L. Price, architect, 731 Walnut street, Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A SUBURBAN DWELLING AT NEWARK, N. J.

We present herewith, in this issue, on page 64, a residence of colonial style, erected for James Cadmus, Esq., on Prospect avenue, Newark, N. J. The design presents a good family house with a pleasing and substantial exterior and a well arranged plan. The underpinning is built of brick laid up in red mortar. The first and second stories are sheathed, papered and then clapboarded and painted colonial yellow with white trimmings. The roof is shingled and finished natural. Dimensions: Front, 40 ft. 6 in.; side, 40 ft. 6 in., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The plan shows a large vestibule with tiled floor and a hall trimmed with oak. The staircase is an ornamental one, running to second and third floors and *porte-cochère* entrance, which is a convenience. Parlor is treated in china white, and is provided with a false fireplace, with tiled trimmings and mantel of excellent design. Library and dining-room are trimmed with oak, and they have open fireplaces, with tiled hearths and facings and mantels. Kitchen and its apartments are

wainscoted and trimmed with yellow pine and finished natural, and each apartment is fitted up in a first-class manner, respectively. The second floor is trimmed with whitewood and finished natural. It contains four large bedrooms, large closets and bathroom; the latter is wainscoted with white English tiling, and pro ided with porcelain fixtures and exposed plumbing. Third floor contains four bedrooms and trunk room. Cemented cellar contains furnace, laundry and other necessary apartments. Mr. James Cadmus, architect and builder, Summer avenue, Newark, N. J.

Our engravings were made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A SUMMER COTTAGE, MANCHESTER-BY-THE-SEA, MASS.

We present herewith as the subject for colors, and also on page 58, a summer cottage, which has been erected for Frederick W. Dorr, Esq., at Manchester-by-the-Sea, Mass. The design is treated in a pure colonial style, simple in its taste, with more regard to the refinement of color effects than elaboration of details. It is of the gambrel roof order, with dormer windows, spacious piazza, and other good features. The underpinning is built of rockfaced shore stone, with a mottled effect of old grays, blues, and browns. The exterior framework is sheathed, and then covered with shingles, and stained a dark brown, soft in tone of color, while the trimmings are painted cream white. The chimneys are built of red and yellow brick. Blinds painted light yellow. Roof shingled and finished a natural silvery gray color. Dimensions: Front, 54 ft.; side, 37 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 9 ft. The main hall is an attractive apartment, and it is treated in enameled ivory. It contains an ornamental staircase with treads, rai's, and post heads of curly red birch, stained dark mahogany, and highly polished, and it also has a paneled seat at side. A vaulted archway at the left of entrance leads into reception-room, which is treated in white enamel. The parlor, or living-room, spacious, is treated in white enamel, and it contains an open fireplace built of Tiffany brick, with hearth and facings of same, and a massive mantel of good design. The dining-room is trimmed with quartered oak, and it has a fireplace trimmed same as the one already described. The kitchen and pantries are trimmed and wainscoted with yellow pine, and are fitted up with the usual fixtures replete. The second floor is trimmed with white pine and treated in china white, and it contains four bedrooms, large closets, dressing-rooms, and bathroom. The bathroom is of the latest style, with marble fl or, tiled walls, porcelain fixtures and exposed plumbing. The third floor contains the servants' quarters, storeroom, and a large billiard-room. Cemented cellar contains furnace, laundry, and other necessary apartments. Mr. Bertrand E. Taylor, of the firm of Rand & Taylor, Kendall & Stevens, 87 Milk Street, Boston, Mass., was the architect.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A GAMBREL ROOF COTTAGE AT NEWTON CENTRE, MASS.

We present herewith, on page 68, in this issue, a gambrel roof cottage of modern treatment, which has been erected for Messrs Alvord Bros., at Newton Centre, Mass. The engravings present a pleasing design with many excellent features, together with a plan which is arranged in a unique manner, and an interior which is artistic in its tone of color and treatment. The underpinning is built of rockfaced stone laid up in neat manner. The exterior framework above is covered with shingles and stained a dark brownish color, while the trimmings are painted white. The roof is shingled and is stained a dark moss green with antique effect. Dimensions: Front, 32 ft.; side, 38 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The hall is a very unique apartment, and it is treated in china white. It contains an ornamental staircase, with balusters and newel posts, treated in a similar manner, while the rail is of mahogany. At first landing there is a cozy window with seat thrown out and provided with a latticed window effect. This hall also contains a paneled wainscoting and a divan at side. The parlor is a spacious room with baywindow and is treated in ivory white, while the dining-room is finished in a sea-green color, cool and attractive in effect. This dining-room contains a window seat and an open fireplace trimmed with tiled hearth and facings and a mantel of artistic design. The kitchen and pantries are trimmed and wainscoted with white pine, finished natural, and each apartment is furnished with the usual fixtures complete The second floor contains four bedrooms, closets and bathroom. It is treated in china white. The bathroom is also treated in china white, and it is furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains two rooms and ample storage. Cemented cellar, contains furnace, laundry and other necessary apartments. Mr. Charles L. Isenbeck, architect, 95 Milk street, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

SOME MODERN HOUSES AT BINGHAMTON, N. Y.

We present herewith, on page 61, in this issue, some modern houses which have been recently erected for G. N. Balcom, Esq., at Binghamton, N. Y. The engravings present two houses of similar design and plan, and of a substantial character. The interior arrangement of both houses is the same, so the plan and description of one house only is presented. The underpinning is built of brick, while the superstructure is of wood, with the exterior framework sheathed, papered, and covered with clapboards. It is painted yellow, with white trimmings. The gables are shingled and stained sienna. The roof is shingled also, and is stained moss green. Dimensions: Front, 28 ft.; side, 40 ft., not including porch Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft; third, 8 ft. The hall is furnished with a paneled wainscoting. The fireplace has a tiled hearth and facings, and a wood mantel. The staircase is an ornamental one, with newel post extending to ceiling with spindle screen at side. The parlor is treated with china white, and is connected with dining-room by double sliding doors. The den at rear of dining-room is conveniently located, and it can be utilized for a bedroom if desired. Kitchen and pantries are wainscoted, and are furnished complete with the usual fixtures. The second floor contains five bedrooms, large closets and bathroom, the latter wainscoted and fitted up replete. There is ample storage room on third floor. Several bedrooms could be provided if desired. Cemented cellar, contains furnace, laundry, and other necessary apartments. Cost, $2,000, complete. Mr A. H. Doolittle, architect, Binghamton, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

Ventilation of Gas-Heated Rooms.*

BY DONALD MCDONALD.

The ventilation of living rooms is one of the most important subjects with which the human race has had to deal. It is vain to supply a man with good food and pure water if his lungs are obliged to deal with bad air.

Like all other very important problems, this one was solved in a scientific way long before science itself was dreamed of. We can imagine a long and painful series of experiments, guided by no other rule but that of the survival of the fittest, before open fireplace, with its radiant heat and its continual draught of foul air from the floor, became the standard method of heating.

Cost aside, I do not consider it possible to devise any better system of ventilation than is provided by an open fireplace, and the nearer our methods approach to this, the nearer, in my opinion, they come to perfection.

With the introduction of furnace heat, the problem is considerably modified. Large volumes of air, either hot or warm, are admitted into a room and left to chance to distribute themselves. If the fireplace has been left open, the displaced cold air will go up the chimney and the room be filled from the top with warm, fresh air. This gives an excellent result. If the flue is closed, the expelled air must then trust to bad carpenter's work for its exit, and the result is, of course, problematical.

Steam heat, using direct radiation, again, presents an entirely different problem. The air of the room is heated by a radiator, the chimney usually closed, and but for accidental openings the same air might remain in a room for weeks and be breathed over and over again, and gather to itself all sorts of organic impurities. Steam heat, using indirect radiation, is simply a very good hot air furnace.

When gas heat is introduced, the problem is again modified. Not only must we deal with the vitiation of the air by the inhabitants of the apartment, but we must also take into consideration the fact that the gas heater itself, in most cases, is putting out into the apartment large volumes of carbon dioxide, water and nitrogen—sometimes less harmless gases—and that it is continually taking from the air of the room the life-giving oxygen, leaving the air to this extent dead and uninvigorating. The products of combustion of any fire are neither more nor less than what the miners call "afterdamp." That is the gas which fills the mine after an explosion has taken place. For want of any other short expression, I shall speak of them in this paper by that name.

All gas heaters may be divided into two classes. One class sends this "afterdamp" up the chimney, and the other puts all, or a part of it, out into the rooms. The last class is decidedly the most numerous, and I will first make up the different ways of accomplishing this result.

First of all, there are stoves, radiators, and fires without any pretense of a flue. These are admissible in rooms which are used only occasionally or which are opened very frequently; or, by providing abundant ventilation, a fairly good atmosphere may be maintained in any room with this class of heater. For bedrooms, for sitting-rooms, or any other close room where the fire is burnt constantly and the windows kept closed, this class of heater cannot be condemned too strongly.

Next comes the heater with a pretense of a flue. I say pretense, because most of the flues provided are totally incapable of carrying off more than a small fraction of the "after-damp" and the air that mixes with it as soon as it is formed.

I have seen a gas grate 24 inches wide provided with four ¾-inch round tubes to carry off all the products of combustion. The manufacturer had soothed his own conscience, and the purchaser, no doubt, congratulated himself on the good ventilation he would get; but, as a matter of fact, these tubes are able to carry off less than four per cent. of the "after-damp" from this fire, and might just as well have been left out altogether.

Another genus of this species of heater provides an ample flue with a damper to close it. The customer finds by experience that he gets very little heat when the damper is open, and consequently closes it tight and allows it to rust in that position.

An open gas fire with a real flue, that is, a flue capable of carrying off all of the "after-damp," is a class to itself, and can only be used in towns where natural gas is sold at a low price. It heats entirely by radiant heat, carries a large amount of air up the chimney, and is an excellent ventilator in every respect. It has only one drawback, which is that, as it only utilizes about fifteen per cent. of the heat, its use is absolutely restricted to the fields where cheap natural gas can be obtained.

It is hardly necessary to discuss the effect of gas when it is burned in an ordinary furnace in place of coal. None of its products of combustion enters the living rooms, and it has in every way the same effect as a coal fire, the ventilation depending on the arrangements for carrying off the spent air, the economy depending on the perfection of the combustion, and the degree to which the products of combustion are cooled before they reach the flue.

The furnace without a flue would seem at first to belong with the first class of stoves described. As a matter of fact, it is a much better fixture. A gas flame is placed directly in the air jacket of a furnace, and, while it sends into the house all of its products of combustion, it sends also a large volume of fresh air. Assuming that the volume of fresh air is fifty times as great as the volume of the "after-damp," and remembering that for every foot of this warm mixture which enters the room a foot of air must be driven out somewhere, we are certain that the percentage of after-damp can never exceed that which rises from the furnace pipes, while in a close room heated by a flueless heater the air is continually passing through the fire and the mixture is being concentrated.

The principal drawback to this plan is that, if the gas should become extinguished for any reason and continue to flow, the house will become filled with a very dilute mixture of air and gas. All sorts of flueless stoves are open to the same objection, although, of course, where the fire is in a living room, the fact that it had become extinguished would be detected much sooner. It is highly improbable that the mixture of air and gas would ever become sufficiently rich in gas as to be explosive, even if the furnace became extinguished, and it remained undiscovered for a week. The "Backus Heater" might be supposed at first to require a class to itself, but it really belongs with the flueless gas stoves. It is true that it has a flue, but the instructions are to close it as soon as the fire gets to burning well, and after that it avowedly puts out into the room all of its products of combustion. Like all other flueless stoves, where the combustion is good, it utilizes every particle of the heat of the gas and puts out into the room every particle of the "after-damp" The water from the so-called vapor pan only adds its quota of steam to an atmosphere already unbearably moist. The water which it vaporizes in the boiler and then condenses again in the radiator, simply gives to the room heat that it has already taken from the fire, no more and no less, and plays no part whatever in the ultimate result on the temperature of the room.

When we come to heaters with real flues, there are very few on the market, but such as there are are rapidly finding favor with the public. Leaving out those which are designed exclusively for the use of very cheap natural gas, the essential requirement of this class of heater is that it shall not only carry off all of its products of combustion, but that it shall provide sufficient radiating surface to abstract from them and give to the air of the room all of their valuable heat before they reach the chimney.

It is also essential that this shall be done without allowing any part of the heater to approach red heat, as air which has come in contact with red hot metal is always disagreeable and frequently poisonous; and, besides, iron that is kept red hot will not last long. If this requirement is fulfilled, we have then in our gas heater exactly the same conditions as to ventilation which we would have with a steam radiation (no better and no worse), and, in order that the room shall be pleasantly and properly ventilated, an opening must be left in the bottom of the plate which covers the fireplace, so that the chimney shall continue to draw away from the room a large quantity of air from the floor. By taking cool air from the floor and not allowing it to pass through the fire we get the same ventilation that we should have with an open fireplace, while at the same time we utilize a much higher percentage of the heat. I consider it possible to utilize 94 per cent. of the theoretical heating value of the gas, without allowing one particle of its products of combustion to escape into the room; in fact, this result is accomplished whenever the combustion is perfect and

* Paper recently read before the Ohio Gas Light Association, from *Heating and Ventilation.*

the products of combustion are delivered to the chimney at a temperature as low as 225 degrees, and when (a most important consideration) no other air except that necessary for combustion is allowed to pass through the stove and up the chimney, thus uselessly carrying away its share of the precious heat.

In order to ascertain just how much heat it was possible to save without cooling the products of combustion, I took an ordinary fireback with flames coming out over its whole surface and heating asbestos wool. I made a thin box of wood, with a face of black sheet iron, and fastened it within three inches of the face of this burner, so that each square inch of hot asbestos had immediately in front of it a square inch of dark sheet iron. The box was filled with cold water, and natural gas was burnt in the burner at the rate of one foot per minute for eighteen minutes. The result was that the water was heated from 42½ degrees to 100 degrees F., while the products of combustion, together with the extra air which they drew in with them, escaped at a temperature of 390 degrees.

The velocity of the escaping air was measured with an anemometer, and after correcting for temperature I found that 2,107 cubic feet of air at 60 degrees had passed through and across this fire, and had been heated from 44 degrees up to 390 degrees, carrying off with it 13,312 heat units. The water, on the other hand, weighed 27 pounds, and, being heated through 58½ degrees, had absorbed only 1,579 heat units, so that the total number of heat units accounted for in the water and air together was 14,891. The total heat in the gas consumed was 16,038, so that 1,147 heat units remained unaccounted for. Some of this heat went through the back of the heater, a portion was radiated sideways and disappeared. Allowing for these losses and for the want of any scientific accuracy in the construction of the apparatus, I think it is safe to say that at least 85 per cent. of the heat of this fire went off in the shape of hot air, and not more than 15 per cent. appeared in the shape of radiant heat.

I do not believe it possible with any form of burner to bring the percentage of radiated heat up higher than 20 per cent., so that I can think it is evident that, if the high-priced heat of artificial gas is ever to be used as a general heating agent, we must either make up our minds to cool these products of combustion before they escape, thereby utilizing their heat, or to tolerate the atmosphere which they produce when they escape into the room. The latter the public may do for a while, but I am satisfied that if the practice becomes general gas heating will become associated with headache and bad odor, and when this occurs its introduction will be difficult indeed.

I was talking not long ago with a very large manufacturer of gas heaters, and called his attention to some of these facts. His reply was that a coal gas heater always smelled bad, that the bad odor could not be avoided, and that, even if it could, the public would not pay the extra cost of a fixture made for this purpose. The demand of the trade was first of all for a handsome fixture, next for a cheap one, and, third, for one which would give a great deal of heat with a very little gas. He also said that he knew a man who was working on a patent burner, which he believed would give such perfect combustion that there would be no products of combustion of any kind. In other words, he believed that four pounds of gas and eighty pounds of air could be burned together and leave absolutely nothing—be utterly annihilated.

Considered from a scientific standpoint, the manufacture of devices for gas heating is far behind that of appliances for gas lighting or gas generating. Competition is certainly keen enough, but, with a few worthy exceptions, it seems to expend its energy in nickelplate, which heat destroys, and in extravagant claims of immense economy to be gained by the perfect combustion caused by some patent burner.

I will here state a few facts about combustion which seem almost axiomatic, and as an apology I will state that I have heard every one of these propositions vehemently and almost fiercely denied by men who seriously claim that when they mix eight feet of air with one foot of gas they get eight times the heat out of the flame. If the makers and sellers of gas fixtures could really be convinced of these propositions, I believe they would then expend their energies on improvements which would actually improve.

Axiom 1. The complete combustion of a cubic foot of gas produces practically the same amount of heat, no matter how it is burned.

2. High flame temperature, or superheating either the air or the gas, has no effect whatever on the quantity of heat produced.

3. The only products of the complete combustion of hydrocarbon gas are carbon dioxide and water, and no amount of ingenuity can have the least effect on the quantities of these produced.

4. Combustion of coal gas is practically perfect when it produces neither odor nor soot.

5. An ordinary fish-tail burner will give just as much heat per foot of gas burned as the most expensive and most delicately adjusted gas heater. It will also give exactly the same products of combustion, both in kind and quantity.

The combustion is certain to be almost perfect in a fish tail burner, or any other open flame of unmixed gas, and is apt to be imperfect when too much air is mixed with the gas, or where the flame is finely subdivided, or where the combustion is confined in a small box or tube which excludes the air.

The fish tail burner fails to heat the lower part of a room simply because the heated air will not descend. If placed at the floor, it would give out exactly the same amount of heat as a flueless gas stove burning at the same rate.

With reference to the effect of humidity on the atmosphere of a room, it is a fact that nearly all persons using stoves of any kind think it is necessary to provide some means of evaporating water so as to avoid what they call the "dry heat." I have heard people complain of this "dry heat" at a time when their windows were dripping with moisture and the air of the room had in it every particle of watery vapor that it was capable of carrying. In other words, "dry heat" is simply a misleading name that has been adopted for a disagreeable heat.

The air out of doors is pleasant just in proportion as it is dry. A day when the thermometer is 95 and the humidity down to 30 per cent. is a pleasant day, while with the thermometer 90 and the humidity up to 95 per cent the day is oppressive, sticky, and disagreeable.

Of course, any practice which becomes customary has behind it somewhere a reason, and I think that this practice of putting vapor into heated rooms came from the fact that the rooms were frequently heated with stoves so small in proportion to the work they had to do that they became red hot, in this way charring the particles of dust which are always floating in the air, and perhaps also putting out some carbon dioxide. The water vapor would certainly carry down a large portion of these charred motes, and might have some effect on the other gases.

Where the stove is not too small and is not allowed to become very hot, where, in other words, we warm a large volume of air instead of scorching a very small volume, I am satisfied that these vapor pans are not only useless, but that they are much worse than useless; and while it may be possible to have the air of a room too dry, it is very easy to have it too wet, and the wet condition occurs much more frequently than the dry. I know of no exception to the rule that a dry climate is healthy and agreeable, while the moist, fog covered low lands are almost invariably oppressive and unhealthy.

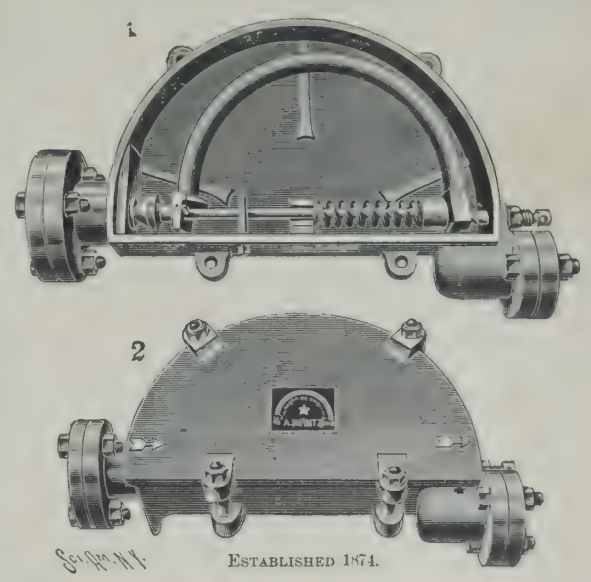
This paper may fall into the hands of some one entirely unacquainted with chemistry, and for his benefit I will say that CO_2 stands for carbon dioxide. It is the product of the complete combustion of carbon. It is given off by the lungs of all animals, and is absorbed by the leaves of all plants. It was known to the ancient alchemists as the "Spirit Sylvester," and was considered a very malignant ghost (geist, gast, gas). It is the gas which smothers the workman in deep wells and caves, and while it is not actually poisonous it has always been considered a very objectionable ingredient in air which is to be breathed.

CO, or carbon monoxide, is the product of the incomplete combustion of carbon. It is one of the chief ingredients in water gas, and is poisonous to the lungs, even if breathed in small quantities. It can be produced by passing air containing carbon dioxide over red hot iron, the iron taking up one atom of the oxygen and forming rust, while the carbon and the other half of the oxygen go off in the shape of carbon monoxide.

Water (H_2O) is necessarily formed whenever any gas containing hydrogen is burned. All illuminating and heating gases contain hydrogen.

AN EFFICIENT STEAM SAVER.

The illustration represents a steam trap that works the same at all pressures, without regulating, which has no air valves or pet cocks, screws, rotating parts, etc., and which thoroughly and quickly blows out steam pipes when steam is first turned on. The Heintz steam trap has been well known for many years in Europe, where it has been used almost everywhere and has become very popular, but it is comparatively new to steam users in this country, to whom it is being introduced by William S. Haines, sole manufacturer, S-136 South Fourth Street, Philadelphia, Pa. It is entirely automatic in its action, and is applicable to steam pipes, heating pipes, etc., and generally to all industrial appliances in which steam is used as a source of heat or power, being made small, light and compact, without any sacrifice of strength or efficiency. The trap is wide open when cold, and, as will be seen in Fig. 1, the valve is controlled by a curved tube spring which is partly filled with a liquid that, heated by the condensed water passing through when the trap is first put in use, completely fills the tube spring at the moment the temperature reaches 197° F. As the temperature of the water increases, the tube spring rapidly extends its extremities, and by the time a temperature of 212° is reached the valve has been forced tightly into its seat, remaining so until enough condensation has accumulated to lower the temperature 1°, when the valve opens enough to pass this condensed steam off, closing again so quickly, however, that no steam escapes. This operation is so rapid and continuous that a constant flow of water is passing off from the outlet of the trap, but no sign of steam is ever apparent. There is no pressure in the trap when at work, and the trap is blown through and cleared of deposit each time it is worked, all air and water being blown out before the trap closes. If the boiler pressure is much above 100 pounds, it may be necessary to adjust the regulating screw, but the strength of the tube spring is sufficient to close the valve and keep it tight against the pressure of 200 pounds. There is no possibility of freezing of the trap, and when the radiator size is used in steam heating systems there is no pounding or noise. No air valves are necessary, and the control of the steam in each room lies wholly with the occupant, as heat can be

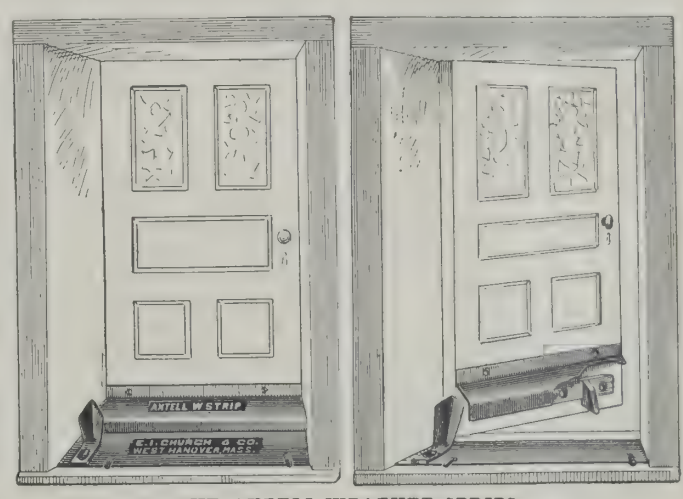


THE HEINTZ STEAM TRAP—INTERIOR AND EXTERIOR.

turned on in only one room of the entire building without its going into the radiators in other rooms, though all the radiators may be fed by the same supply pipe and drained by the same exhaust, for no steam in any radiator can get beyond the trap attached to it. The manufacturer is in possession of many records showing material savings in establishments equipped with the Heintz traps, and a recent communication from the Massachusetts Institute of Technology testifies to its perfect working under pressures varying from 100 to 150 pounds.

IMPROVED WEATHER STRIPS.

The accompanying illustrations represent the well-known Axtell All Steel Weather Strips, manufactured solely by E. I. Church & Co., West Hanover, Mass. This excellent strip is unlike any other device of its kind, and enjoys an immense sale, because it is wholly steel, and cannot warp or split; it has no wood or springs to break, or rubber to harden and pull out, and is not affected by sun or ice. It is raised from the hinge side, and does not need a stumbling block in centre of sill or double doors. The bottom plate saves all wear on threshold, insuring a perfectly tight joint until worn out. Constant use on hotels, churches, and schoolhouses for six years shows they will last many years. It has only two castings, which are specially tough, and cannot be broken with a hammer. It is finely lacquered in maroon; it adds to the appearance of any door, and for especially fine residences is furnished in polished brass. Each strip is packed separately, with fixtures for same in a separate envelope, which is of great help to retailers. The company will gladly furnish free, single strips to be applied and tested with any other strip on the market.



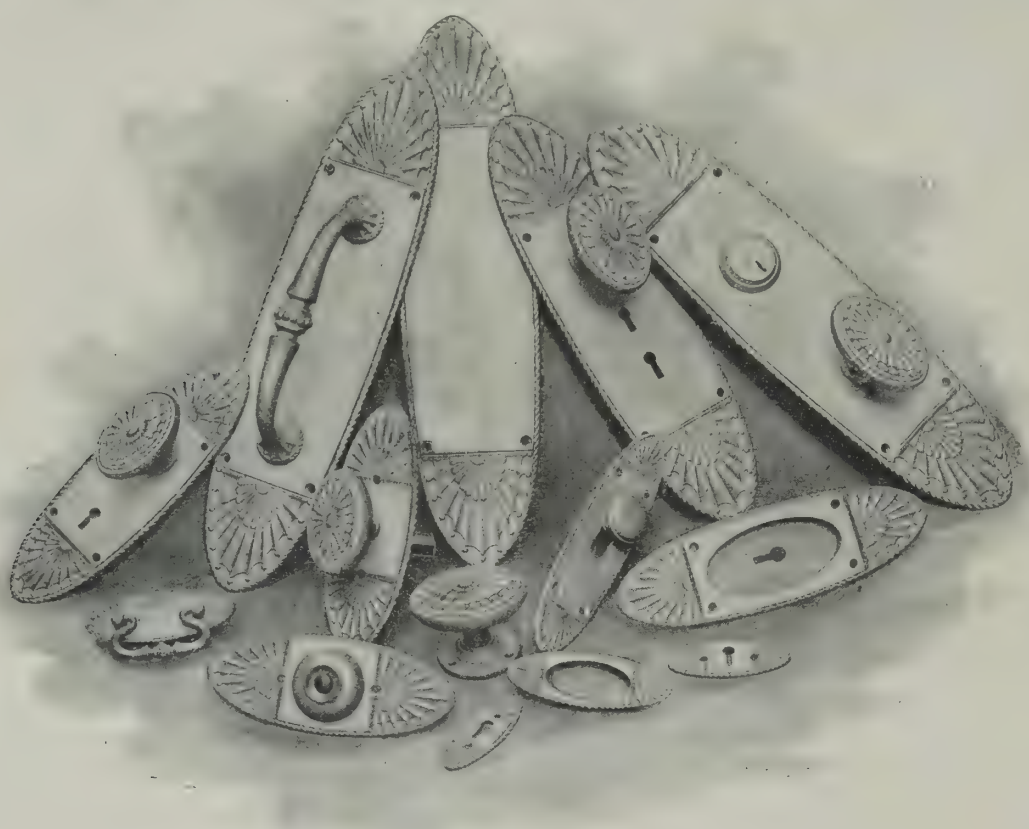
THE AXTELL WEATHER STRIPS.

"Why and How to Use Red Lead," is the title of an interesting pamphlet issued by the National Lead Company, of No. 1 Broadway, New York. It contains numerous extracts from discussions by members before the American Society of Civil Engineers, on the "Painting of Iron Structures," and should receive the attention of all consumers of paint for metal.

THE late Robert H. Lamborn bequeathed $200,000 to the Academy of Natural Sciences, of Philadelphia.

ARTISTIC HARDWARE.

The illustration represents one of many rich and beautiful styles of trimmings for buildings published in "Sargent's Book of Designs," issued by Sargent & Co., makers of Artistic Hardware and Fine Locks, 37 Chambers Street, New York. These goods are made in proper proportions, and are right mechanically as well as beautiful in design. Several of the styles have been designed especially to harmonize with the colonial style of architecture, but there are many others, calculated to suit every taste. They are also made with any desired finish, as bronze and copper, rustless iron or blue black, and gold, silver, and nickel plated.



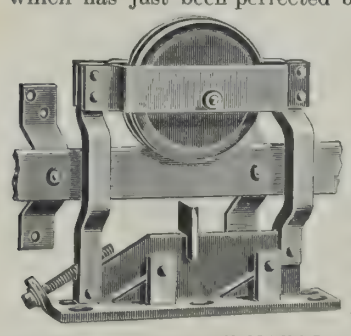
A RICH DESIGN, COLONIAL STYLE, HARDWARE TRIMMINGS.

After the great fire of 1873, says an exchange, the cost of bricks laid in the wall was ordinarily reckoned in Boston at $36 a thousand. Now, better bricks, quite as well laid, with better lime and cement, cost there, in the wall, $15 a thousand. Fireproofing processes have been greatly improved and cheapened, so that an ordinary mercantile building can be erected, with floors, roof, and partitions, all of iron and concrete, or terra cotta, for ten to fifteen per cent. more than it would cost with cheap wooden floors.

Driving away mice from infected cellars is said to be successfully accomplished by woolen rags soaked in oil or turpentine, and placed in front of the holes by which mice enter.

A NEW PARLOR-DOOR HANGER.

We illustrate herewith a new Ball Bearing Hanger which has just been perfected by Messrs. Lane Bros., of Poughkeepsie, N.Y. The goods retain all the well-known valuable features of their Standard Parlor Door Hanger, now so well known, while the wheel is fitted with the *best form of bicycle bearings*. The makers lay particular emphasis upon the excellence of this bearing, which conforms in every particular to the latest bicycle practice. A hanger so built is more expensive to make, but is not to be compared with one fitted with poor, unreliable bearings, particularly when the inaccessibility of its position when in use is considered. The makers claim to spare no pains or expense in the manufacture of this hanger, and believe it will be appreciated by the trade.



A NEW PARLOR-DOOR HANGER.

An Ingenious Color Combination Chart.

To show the effect of different combinations of colors for the body of the house and its trimmings, and the roof, chimneys, etc., Samuel Cabot, of Boston, Mass., manufacturer of Cabot's well-known creosote shingle stains, has recently issued a pamphlet of decidedly novel character in this line. It is a book of colored plates representing only one style of a long, low, but substantial house, presenting a much broken roof line, and along this line the plates are divided, so that the application of different combinations of colors to the body and the roof may be readily compared. By lifting either the top or bottom section of the page one can see at once a much different looking house, according to the varying combinations of colors thus presented. Sixteen separate and distinct combinations of colorings for the same house may thus be seen with only the trouble of lifting the different half leaves. Architects and builders may thus be greatly aided in selecting a color scheme for structures of various classes.

"Colophite."

This is a comparatively new word, and the name for a new compound, which is neither a gum nor a resin, but partakes of the nature of both, while it can be so prepared that it will unite with any ordinary solvent, or may be molded into any form as a solid. It is the invention of Mr. S. J. Hoggson, a synthetic chemist, and is made by the Colophite Manufacturing Company, of New Haven, Conn., in forms fit for many uses, as dip, brush, aluminum, or silver lacquer; paints, bronzing liquids and decorative enamels; marine enamel, for the hulls of vessels; bath enamel, trolley insulators, and molded colophite. Colophite solutions are also furnished for enamels, paints, varnishes, japans, waterproofing, etc. It flows readily from the brush, has a good body, and dries quickly. By varying the proportions of the ingredients, it may be made to resemble stone, wood, ivory, horn, whalebone, leather, or bone, and is susceptible of a very high polish. It will preserve and waterproof sails, nets, tents, awnings, and all fibrous textiles, which will not mildew or rot after treatment with colophite; and canvas or cloth shoes impregnated with it are as impervious to moisture as rubber. As some of the colophite compounds are of a nature resembling celluloid, it might be interesting here to know that the inventor of colophite was the first man in the United States to manufacture the compound now known as celluloid, under the name of "Synthetic Ivory," from 1861 to 1866, spending many thousands of dollars in the work. Colophite paints are made in any desired grade of finish, depending on the proportion of oil or gum used. The general finish of the paint is a pleasing semi-flat, bone-like surface, covering a latent polish which may be produced equal to the finest ivory by rubbing it when dry with a clean rag. Colophite paint may be dipped or brushed, and it may be air-dried or baked, to suit the desired uses.

Faber's Pencils have long been well known all over the world, but there are comparatively few people of the millions who use these pencils who have any idea how very extensive is the industry of making them, and the various inks and water colors, whose production was entered into after the making of pencils alone had become a great business. The A. W. Faber pencils, which were at first made in the family in a small way in 1761, now fully employ a score or more of great factories at Stein and Geroldsgrün, Bavaria, and at Noisy-le-Sec, near Paris, and consume the entire product of an extensive Siberian graphite mine. This graphite is acknowledged to be unexcelled for the purpose, and the pencils made therefrom have obtained the highest recognition from architects and others. A pamphlet giving the history of the house will be mailed to architects and others who write therefor to A. W. Faber, No. 78 Reade Street New York, and samples of their pencils will also be sent free to architects who make application for them.

The Bommer Spring Hinges are used in every one of that marvelous group of high buildings which has been raised with unprecedented energy in New York in recent years, including the Manhattan Life, Bowling Green, American Security, Standard Oil, Bank of Commerce, St. Paul, Presbyterian, Manhattan Hotel, etc. These hinges have become famous for their easy movement.

A REFRIGERATOR FOR PRIVATE RESIDENCES.

The accompanying illustration represents a refrigerator which, instead of having to be supplied with ice from the inside of the room in which it is placed, has a small door for this purpose opening on the porch outside, and built in the proper position to suit the ice door of the refrigerator. This style of refrigerator is manufactured by the McCray Refrigerator and Cold Storage Company, of Kendallville, Ind., and has become very popular. The iceman cannot get at any of the articles in the refrigerator proper, and the drip and dirt of carrying the ice into the house are avoided. These refrigerators are wood lined, and are constructed stationary, in new houses, being made at the factory; also in styles of finish and sizes to accommodate almost any location, in a pantry, china closet, or kitchen, where proper arrangements may be made for their being iced from the outside.

THE McCRAY REFRIGERATOR—ICED FROM THE OUTSIDE.

SCIENTIFIC AMERICAN.

Building Edition.

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BOSTON PUBLIC LIBRARY

INTERIOR VIEW OF MESSRS. TAYLOR AND PECK'S COTTAGE AT FORDHAM HEIGHTS, NEW YORK.—See page 75.

Scientific American.

ESTABLISHED 1845.

MUNN & Co., Editors and Proprietors,

No. 361 BROADWAY, NEW YORK.

NEW YORK, NOVEMBER, 1897.

THE

Scientific American.

BUILDING EDITION.

ESTABLISHED 1885.

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THE ELEVATOR PROBLEM IN LOFTY BUILDINGS.

The many accidents which have recently occurred in the elevator equipment of tall buildings in New York city, prove that one of the many problems connected with the construction and operation of such buildings has yet to be worked out to a satisfactory solution.

When the era of lofty buildings set in it brought with it many structural difficulties, most of which have been successfully overcome by the skillful use of the new materials of construction. As far as the mere questions of strength and stability are concerned, it is possible to add story to story until a height is reached beyond which it is impracticable to go, not because the lower parts of the structure would lack the strength to carry those above, but because the space demanded for the accommodation of the necessary elevators would take up so much of the floor space as to render the building commercially unprofitable. As it is, however, the building of twenty-five stories, which we may take as the limit of profitable height, presents no difficulties of construction, either in the foundations or superstructure, that cannot readily be overcome by the resources of the architect's and engineer's art.

It was early foreseen that the increasing height of office buildings brought with it increasing risks from fire, and a vast amount of thought and skill has been shown in the various devices for preventing the outbreak of fire, and controlling and localizing its effects in a burning building. That the best systems of fireproofing are only partially effective, is shown from time to time, when a fierce conflagration attacks a building so protected, and the best we can say of such work is that it mitigates the destruction, but does not prevent it. As a rule the steel skeleton is all that remains of a modern building after a fire has once taken a firm hold upon it. It would seem, however, as though nearly everything that can be done in the way of encasing steelwork and laying fireproof floors, has been done, and that future improvements will be in the direction of a more complete elimination of woodwork in the form of partitions, doors, windows, and office furniture.

There is no doubt, however, that there is room for improvement in the modern elevators which serve these lofty buildings, improvement not in the speed or frequency of the service, which is usually all that could be desired, but in the appliances which safeguard the passengers. In the days of six and eight story buildings, when a moderate speed sufficed and express elevators had not been thought of, an elevator accident was a comparatively rare occurrence; but as the height to be traversed increased, the speed has increased, the record of disaster has grown at an alarming rate, and accidents have happened with uncomfortable frequency. In New York city, within the past few months, there have been several cases of cars running away or of cables breaking, and all of them have resulted either in the partial disablement or death of the passengers or employés.

The accidents have been directly traceable either to the improper working of the motive power or to the actual breakage of the hoisting cables. Of the two causes the former is the least disquieting, for the reason that it is generally due to faulty design and may be corrected; but the breaking of the elevator ropes without any assignable cause whatever, as happened recently in the Waldorf Hotel in this city, is a matter of serious import, and should call for searching investigation. The steel ropes are usually made strong enough to carry from eight to ten times the greatest working load that can be put upon them. In the case just mentioned, the ropes had been renewed shortly before they gave way, and a careful examination of the wreck fails to show any assignable cause for their parting. The broken ends bore no evidence of abrasion, and one is driven to the conclusion that some enormous strain, eight or ten times as great as that provided for, was suddenly set up in the ropes. The mechanism was of the well-known high-speed hydraulic type, with multiplying sheaves, whereby the car was caused to travel many times farther than the hydraulic plunger.

An explanation which is frequently offered is that the fracture is caused by the ropes becoming "kinked," and the car suddenly dropping several feet as the kink is straightened out—the twist in the ropes, coupled with the dynamic effect of the falling car, serving to sever the ropes. The kink is supposed to result from the sudden stopping and starting which occurs in high speed elevators. While this explanation is plausible, it does not seem sufficient. In any case, there is no question that there is a call for some design of elevator that will be free from this liability. Whether the danger can be overcome by some device that shall better control the cables, or whether an elevator can be constructed which shall dispense with the cables altogether and shall be positive in its action, remains to be proved; but that the best form of elevator remains yet to be invented must be evident to any one who has taken note of the recent disasters. The failures have by no means been restricted to one element in the mechanism; they have occurred at every point: for in some cases the motive power has failed, in others the cables, and in others the safety appliances have failed to act, this last being the case in the accident at the Waldorf Hotel above referred to.

A SUMMER RESIDENCE AT MANCHESTER-BY-THE-SEA, MASS.

We present herewith, in this issue, on page 86, a summer residence, erected recently for George M. Morgan, Esq., at Manchester-by-the-Sea, Mass. The engravings present a design with attractive elevations, which are unique in their character for a summer home. One of the most pleasing features is the broad, spacious and well shaded piazza. The underpinning is built of rockfaced stone in a neat manner. The superstructure is built of wood, with the exterior framework covered with shingles, and stained a dark brown, warm in tone of coloring. The trimmings are painted cream white. The roof is shingled and stained a moss green. Dimensions: Front, 88 ft.; side, 42 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The main hall is a very handsome apartment, circular in form, and it is treated with ivory white. The staircase is a winding one, with seat at side, and newel posts formed of a cluster of spindle balusters, sweeping gracefully at each side; this stairway being treated in similar style with colonial effect. There is a paneled wainscoting, archways, and an open fireplace, with facings and hearth of brick, and mantel handsomely carved. The den is stained a rich dark green, and is provided with paneled wainscoting and columns, colonial, rising to ceiling and separating den from fireplace nook, which contains seats, and fireplace built of rough fieldstone, with facings and hearth of same, and mantel shelf. The drawing-room and dining-room are treated with ivory white, and each have open fireplaces, trimmed with brick faces and carved mantels; the former has a circular bay, with seats, while the latter has a paneled wainscoting. The rear hall, pantries, toilet, kitchen, laundry, and storeroom, are trimmed and wainscoted with white pine, and are furnished with the best improved fixtures. The second and third floors are trimmed with similar wood, treated in delicate colors. The second floor contains a large open hall, four bedrooms, dressing-room, bathroom, closets, and three servant bedrooms. The bathroom is wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. Cemented cellar contains furnace and other necessary apartments for a well appointed house. We also present a view of the stable, on page 87, designed in harmony with the residence, and containing carriage-room, stable, and coachman's rooms on the second floor. Messrs. Winslow & Wetherell, architects, Philips Building, No. 3 Hamilton Place, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A GAMBREL ROOF COTTAGE AT NEWTON CENTRE, MASS.

We present as a subject for page 84, in this issue, a design for a gambrel roof cottage which has been erected for Mr. Paul, at Newton Centre, Mass. The design is unique in its character, and presents many pleasing features. The underpinning is constructed of rockfaced stone, laid up and neatly pointed in white mortar. The superstructure above is covered on the exterior with sheathing, and then shingled and stained a reddish brown color, with white trimmings. The blinds are painted cream white. The roof is shingled and stained moss green. Dimensions: Front, 42 ft; side, 34 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The hall is spacious, and it contains an ornamental staircase with seat and broad landings. The parlor is treated with ivory white, and it contains a bay window and an open fireplace, built of brick, with tiled hearth and facings and mantel. The library and dining-room are trimmed with sycamore, and the latter contains seat in window and a nook for buffet. The kitchen and pantries are trimmed and wainscoted with pine, and are finished natural. These apartments are furnished complete with the usual fixtures. The lobby is large enough to admit ice-box. The second floor contains four bedrooms, large closets and bathroom, the latter wainscoted and furnished with the usual fixtures and exposed plumbing. There are two bedrooms and ample storage on third floor. Cemented cellar, under whole of house, contains furnace, laundry, and other necessary apartments. Mr. C. S. Isenbeck, architect, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

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McMAHON HALL, CATHOLIC UNIVERSITY, WASHINGTON, D. C.

The University is quite an old institution, and is the seat of learning for Catholics in and around the vicinity of Washington. On the portal of the building are carved the words, "Science, Philosophy, Letters." In the rotunda of the hall is a beautiful statue of the "Virgin Mary," and another of "Pope Leo." The former is said to have cost $1 000, and the latter, $5,000.

The University now has two halls, named Divinity or Caldwell Hall, and the new granite building, "McMahon Hall," or the Hall of Philosophy, Letters and Sciences, which faces towards the south, and presents a massive, yet symmetrical appearance, with a tower in the centre, of which we herewith give an illustration.

The building consists of a centre building four stories high, 70 feet by 104 feet, and two wings, 70 feet by 90 feet each, three stories in height. It is built of Port Deposit granite, with cut granite trimmings. It is treated in the Romanesque style of architecture, and is semi-fireproof, with heavy timbered floors, brick and terra-cotta partitions and iron staircases. The main floors of entrance way, grand lobby, and corridors, are of marble Tarrazza, laid on brick arches and iron beams. The interior is all finished in hardwoods, quartered oak, ash, and cypress.

McMAHON HALL, CATHOLIC UNIVERSITY, WASHINGTON, D. C.

The walls are wainscoted and finished with hard plaster. The whole basement is finished and devoted to physics, recreation halls, post office, storerooms, boilers, etc. The first floor contains the School of Social Sciences, Mathematics, Physical Lecture Room and Apparatus, and the offices of the Rector and Vice-Rector. The second floor contains a large Assembly Hall in centre building, and the School of Letters and Department of Biological Sciences in the wings. The third floor contains the Museum of Anthropology in centre; Philosophy, Letters and Psychology in one wing, and the Chemical Laboratories in the other. The latter is fitted up in the most elaborate manner with cases, tables and fixtures of the most approved kind for chemical work and instruction, as are also all the other departments. The lecture rooms and private studies for the professors are located in close proximity to the various lecture rooms and laboratories. The Chemical Lecture Room and Museum are located in the fourth story of the centre building, the latter being fitted up with cases filled up with valuable specimens. The building is heated by steam from two high pressure boilers placed temporarily in the basement, furnishing power to run an engine and two electric dynamos for lighting this and all other buildings. The architects were Messrs. Baldwin & Pennington, No. 44 South street, Baltimore, Md.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

"FIELDSTONE."—A RESIDENCE AT SCRANTON, PA.

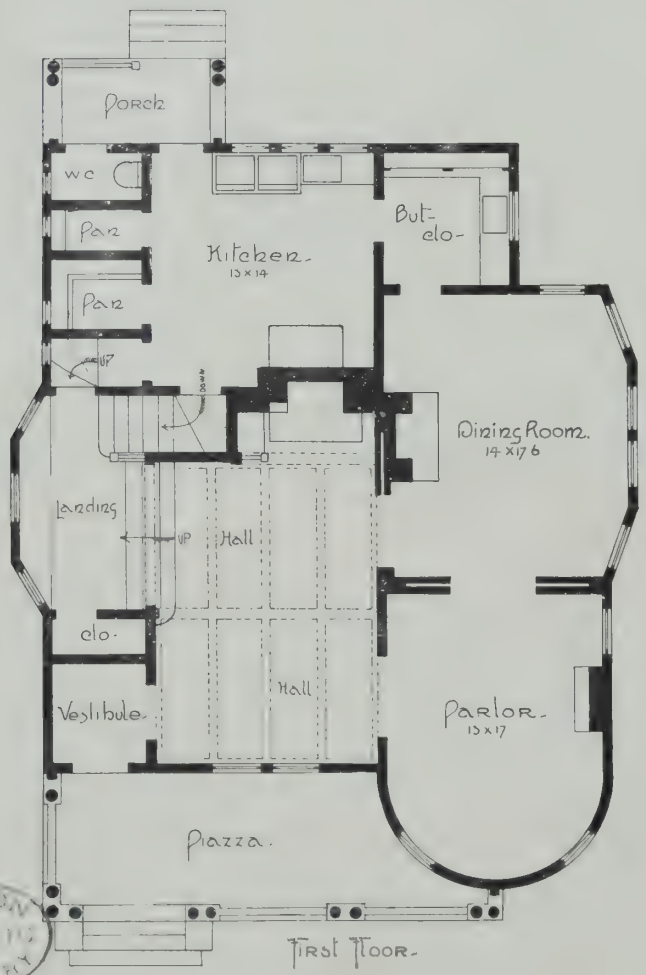
We present herewith, in this issue, on pages 80 and 81, "Fieldstone," a residence erected for Thomas E. Jones, Esq., a coal operator, of Scranton, Pa. The engravings present a design of unusual beauty in its treatment, combining many attractive features, pyramidizing to the tower, which is the finishing touch to the whole *tout ensemble* of the building. The underpinning and part of the first story is built of fieldstone, laid up at random. A pleasing feature is the posts at piazza and portecochère, which are built of similar stone. The remainder of the building is constructed of wood, with the exterior framework covered with shingles, and painted light yellow, with white trimmings. The roof is shingled and stained moss green. Dimensions; Front, 65 ft.; side, 59 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 11 ft.; second, 9 ft. 6 in.; third, 9 ft. The main hall is an unusually attractive apartment, and is fitted up in a unique manner. It is trimmed with oak, and has a paneled wainscoting and massive ceiling beams. The grand staircase, with its broad steps, is provided with an arcaded effect, formed by columns extending to ceiling, from which spring a circular arch, handsomely decorated. The main landing contains a cluster of windows, glazed with stained glass from designs by Tiffany. The balusters and rail are of handsome design. The large, open fireplace, has a mantel with similar columns, and a tiled hearth and facings, with wrought-iron trimmings. Stairs wind down to toilet, which is under staircase, and which is treated with some excellent grille work. The drawing-room is a very handsome apartment, is circular in form at both ends, and is treated with green, silver, and gold in a pleasing contrast. The open fireplace is furnished with white tiling, gold dog-irons and trimmings, and a mantel of exquisite design. The library is trimmed with oak, and it has bookcases built in, paneled divans, ceiling beams, and a fireplace trimmed with tiles, and a mantel of oak with over-mantel. The den is trimmed with antique oak, and it has a paneled seat running around two sides of the room, and an open fireplace, with bookcases built in on either side of same. The dining-room is trimmed with cherry; it has a paneled wainscoting, parquet floor and buffet built in and handsomely carved. The fireplace has a tiled facing and hearth, and mantel. The breakfast room, treated in white and blue, with conservatory adjoining, is an attractive apartment. The kitchen and pantries are wainscoted, and trimmed with hard pine, and are furnished with the usual fixtures complete. The second floor contains a large, open hall, five bedrooms, closets, linen room, bath, and servant's bedroom. The various apartments are trimmed with hardwood. The bathroom is wainscoted, and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains several bedrooms, storerooms, and billiard-room. Mr. E. G. W. Dietrich, architect, 18 Broadway, New York.

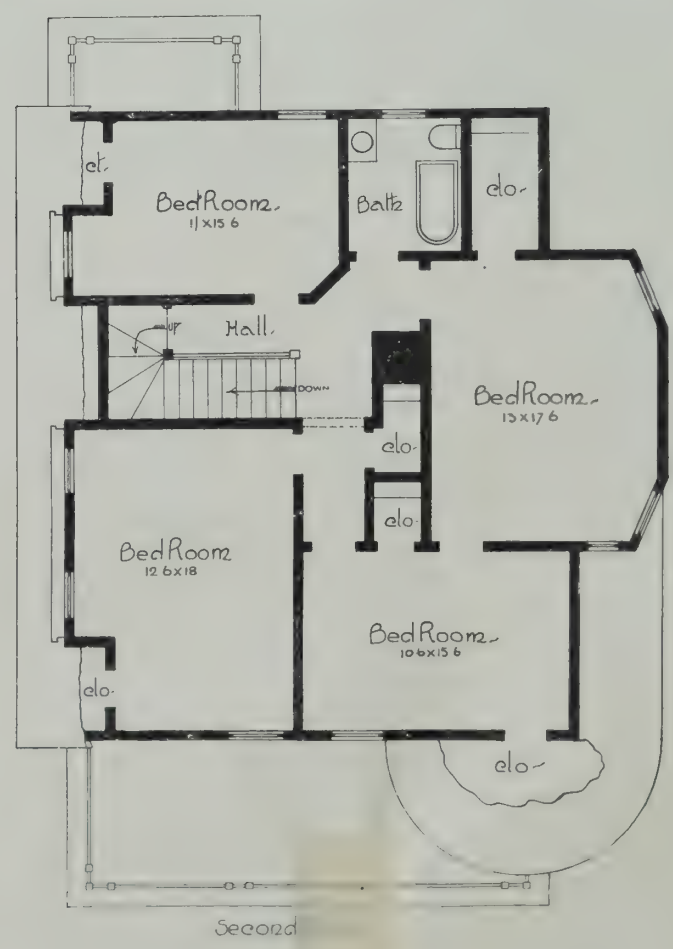
Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A SUBURBAN COTTAGE AT FORDHAM HEIGHTS, NEW YORK.

We present as the subject for colors, and on pages 73 and 76, a suburban cottage at Fordham Heights, New York, erected for Messrs. Taylor and Peck. The engravings present a style of excellent character for a suburban dwelling, with many good features and fine detail. The underpinning is built of rockfaced bluestone. The building above, of wood, is sheathed, papered, and covered with clapboards and shingles. The clapboards are painted a light gray color, and the shingles a natural silvery-gray color. The trimmings are painted white. The roof is covered with shingles, and is stained a light slate color. Dimensions: Front 35 ft; side, 37 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior is very handsomely finished, and it combines a most unique interior arrangement. The main hall is a very spacious apartment. It is trimmed with oak, and it has a paneled wainscoting, hardwood floor, ceiling beamed and ribbed, and a cozy nook containing seat, and fireplace built of Tiffany brick, with facings and hearth of same, and mantel shelf. The staircase, with its broad landing and window seat, is also an excellent feature, giving privacy to the servants' stairway, which rises to this landing. The parlor is finished in cherry, and the floor is of oak. The false fireplace has tiled trimmings and mantel. The walls are covered with burlap of a greenish color, while the frieze and ceiling is gilded, the whole effect being in perfect harmony. The dining-room is trimmed with oak, and the wall scheme is carried out in a similar manner. It has an oak floor, and an open fireplace, with brick tile hearth and facings, and a carved mantel. The pantry is fitted up with the usual fixtures, drawers, dressers, sink, and cupboards complete. The kitchen is replete in every respect, and it is wainscoted with white enamel tiling. The second floor contains four bedrooms, large closets, and bathroom, the latter wainscoted with white enamel tiling, and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains two bedrooms and ample storage. Cemented cellar contains furnace and other necessary apartments. Messrs. Benedict & Neu, architects, No. 489 Fifth Avenue, New York.

Our engravings were made direct from photographs of the building, taken especially for the SCIENTIFIC AMERICAN.





A SUBURBAN COTTAGE AT FORDHAM HEIGHTS, NEW YORK.—See page 75.

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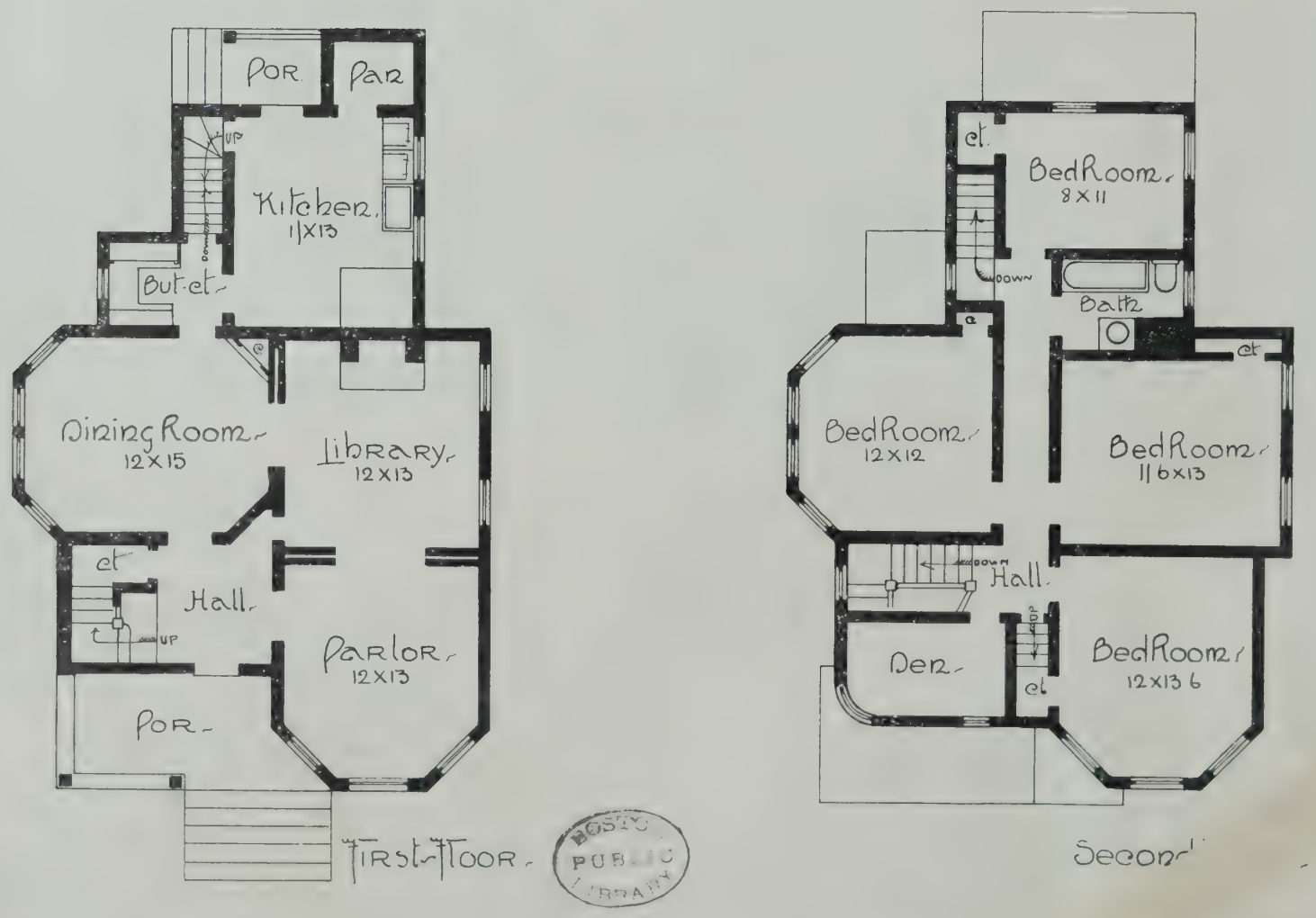
A RESIDENCE AT DEVON, PA.—See page 87.



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A COTTAGE AT HACKENSACK, N. J.—See page 87.

INTERIOR DECORATION.

THE VALUE OF COLORED GLASS IN DOMESTIC ARCHITECTURE.

The value of colored glass as a decorative feature in ecclesiastical work is indisputable, and has always been recognized and applied the world over by architects and decorators. Not only has it been adopted for mere embellishment in that field, but its use in memorials has also long been popular, as is well known; but where it has been but seldom used in the United States in an elaborate way, is in domestic architecture. It is in this direction it is beginning to make for itself a reputation, which not only indorses its appropriateness for beautiful effects, but establishes its importance as an artistic medium, of which men of the highest talent, of incontestable genius, gladly avail themselves in adorning a house.

Certainly nothing can compare with glass in color, dryness, durability, and, above all, transparency, in the entire province of decoration. Non absorbent, limitless in its diversity of tone, endless in variety of texture, and in its combinations with itself, it has an individuality and a poetic suggestiveness as indescribable as they are alluring.

Paintings on canvas, or on porcelain, pale before pictures in colored glass, because they have not the glow, the atmosphere of perspective, and that power of alliance with light itself, which render glass all that it is in its pictorial power, its brilliant and luminous beauty.

As the art of the glazier, identified with the dawn of civilization, has again been revived with unusual success of recent years, particularly in this country, the inherent qualities of glass as a decorative material have been demonstrated in a way that now makes it an exponent of color effects which excel even the most beautiful ones of the Middle Ages. Favrile glass, the discovery of Mr. Louis C. Tiffany, produced by what is believed to be a new formula, seems to have revolutionized the entire process of the manufacture in the United States, and while particularly adapted for windows and mosaics through its remarkable range of color, expresses itself with equal effectiveness in blown, cast, rolled, wrought, and cut ornaments.

Vases, lamps, bowls, and other ornamental objects, influenced in their formation by those most graceful and delicate of all models, the flower-forms in nature, are further beautified by carving, by cutting through one layer of glass down to one of another color, by enrichments of metallic lustres, and iridescent irradiations of scintillating colored lights rivaling the most lovely hues of the rarest opal.

The exquisite tints on the glass amphoræ of the Cesnola Collection in the Metropolitan Museum of Art are reproduced in these ornaments with a startling *vraisemblance* which intimates how close has been the study of the processes involving the natural decay of glass, in the manufacture of the new forms. The process of decay is checked by reversing the action in such a way as to arrive at the effects, without compassing the actual disintegration itself. The result of this discovery has been that the great museums of the world have purchased collections of Favrile glass for permanent exhibition.

It can be readily seen how invaluable the application of a new process like this must be, in connection with *windows* in colored glass. The infinite variety of color schemes of which the new glass is capable, and its admirable ductility in course of production, alike contribute to its evident artistic qualities for the objects required, and naturally place at the command of the artist facilities which are obvious enough where the capacity of the medium employed indicates such scope.

ONE OF THE HESPERIDES.

WINDOW OF COLORED GLASS IN A PRIVATE HOUSE AT PHILADELPHIA, PA. DESIGNED BY MR. FREDERIC WILSON.

"There suddenly shone out a light,
. . . . which, as it blazed,
. . . . . .
Displayed two eyes, sparkling between
The dusky leaves, such as are seen
By fancy only, in those faces
That haunt a poet's walk at even,
Looking from out their leafy places
Upon his dreams of love and heaven:
. . . . . .
A form, as pliant as the young shoots
Of a young tree in vernal flower;
Yet round and glowing as the fruits
That drop from it in summer's hour—
. . . . . .
And stamped with such a seal of Mind,
As gave to beauties, that might be
Too sensual else, too unrefined,
The impress of divinity!"

The example presented here, as an illustration of the adaptability of colored glass to the higher forms of art, is singularly apposite for the purpose, both in the nature of the subject, and in the superb interpretation it has received at the hands of its author, Mr. Frederic Wilson, of the Tiffany Glass and Decorating Company. It is one of three windows in the hall of a private house in Philadelphia, Pa. These three windows represent "The Hesperides," Aeglé, Hespera, and Erytheïs—the three daughters of Atlas, King of Atlantis—to whom Juno had originally consigned the care of the Golden Apples presented to her on her wedding day by Titaea, "a goddess of the earth," but who, being unable to resist the temptation to pluck and eat the fruit, were obliged to resign them to the guardianship of Ladon, a serpent, whom Juno summarily installed in their place. It was one of the labors of Hercules to capture this apple tree from the clutches of Ladon, which task, with the assistance of Atlas, he successfully accomplished, slaying in the meantime the serpent. As a fruit tree among the ancients was a symbol of the starry heavens, the fruits typifying the constellations, the significance of the astronomical allegory conveyed in the story is evident enough, while all the legendary lore concerning the lost Atlantis, the famous island of the Atlantic opposite the Mediterranean Sea—the remnant of a continent—described so interestingly by Plato, revives with renewed fascination in the glow of this presentment of Mr. Wilson's art. Scholars have long since identified the Gardens of the Hesperides, which Hesiod located "beyond the bright ocean," opposite to where Atlas stood supporting the heavens. They and the Garden of Eden are one and the same with Atlantis—the true antediluvian world—and represent a universal memory of a great land, where early mankind dwelt for ages in peace and happiness, and whose religion was that of the Tsabaists, or planet-worshipers—the same as that of the Egyptians and Peruvians. The memory of its destruction survives in our own time in the Deluge legends of the different nations of the Old and New Worlds.

It is well said that architecture, like everything man has to do with, comes under the universal LAW OF CONSEQUENCE. In short, that similar conditions produce like results; consequently, when we find our homes taking upon themselves something of a permanent character, their decorations are quite naturally governed by the nature of the construction.

If we find that construction possessing those indestructible qualities which are likely to defy time, then we adapt the decorations to the construction, making use of those which resist decay or corrosion, and whose applications, like glass, are so numerous and beautiful. In glass mosaic, then, we have a material which has all the requisite qualities for this purpose—a material which holds its pristine beauty longest, is fire-proof, and indestructible except by direct violence.

A WORKINGMAN'S COTTAGE AT LESTERSHIRE, N. Y.

We present herewith, in this issue, on page 85, a workingman's cottage, which has been erected for Mr. E. Tilleson, at Lestershire, New York. The design is of suitable style, with porch and bay window. The underpinning is built of rock-faced stone. The framework is sheathed and clapboarded. It is painted light gray, with white trimmings. The blinds are painted bottle green. The roof is shingled and finished natural. Dimensions: Front, 27 ft.; side, 40 ft. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. The interior arrangement is quite complete, and it is trimmed with white pine throughout and painted in colors. The entrance is to living-room, from which rise the stairs to second floor. The parlor has also an entrance, and it has a bay window thrown out, and a false fireplace, provided with a neat wood mantel. The kitchen has two good-sized closets and sink. The second floor contains four bedrooms. The bedrooms over living-room could be turned into a bathroom if desired. The third floor contains ample storage. Cost, $900 complete. Mr. E. Tilleson, architect and builder, Lestershire, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN DWELLING AT JAMAICA, L. I.

We present in this issue, on page 83, a modern dwelling-house which has been recently erected for Mr. William Hardenbrook, at Jamaica, L. I. The design has many good features, including piazza and tower. The underpinning is built of brick, while the posts at piazza and underpinning at tower are built of rock-faced stone.

The superstructure is of wood, with the exterior framework sheathed and the first story clapboarded and painted light olive green with bottle-green trimmings, while the second story is covered with red cedar shingles finished with a mottled effect. The roof is shingled and finished natural. Dimensions: Front, 39 ft.; side, 47 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. The vestibule has a tiled floor and is paneled and trimmed with oak. The hall is trimmed with similar oak, and it contains an ornamental staircase with turned newels, posts and balusters, a paneled divan, and an open fireplace with tiled hearth and facings and mantel. The parlor is treated in china white, and it has a fireplace with Mexican onyx facings and hearth, and a mantel of dainty design. The library is trimmed with oak and is circular in form. The dining-room is trimmed with cherry, and it has a large closet and a tiled fireplace with mantel. The butler's pantry is a spacious one, with sink, dresser, cupboards and stairs to cellar, and it has also an outside entrance thereto. The kitchen is trimmed and wainscoted with yellow pine, and furnished with sink, washtrays, closet, dresser and fireplace for range. The second floor is trimmed with white pine and treated in colors. This floor contains four large bedrooms with closets and bathroom. The latter is wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains two bedrooms and ample storage room. Cemented cellar contains furnace and other necessary apartments. Messrs. Harmer & Hardenbrook, architects, 189 Montague street, Brooklyn, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"FIELDSTONE," A RESIDENCE AT SCRANTON

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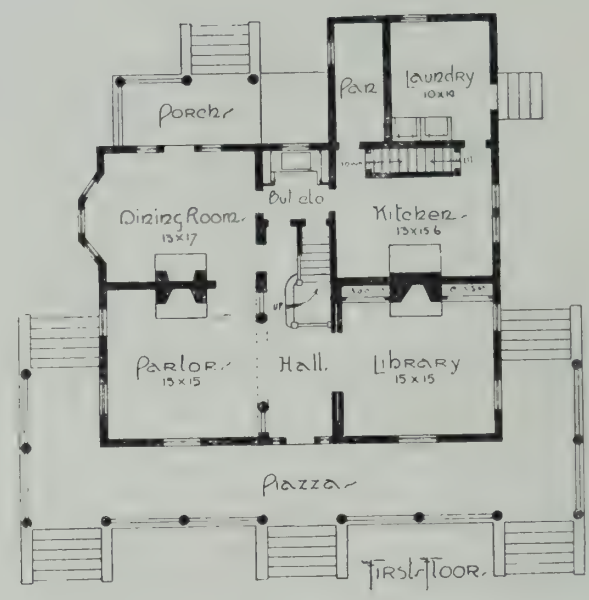
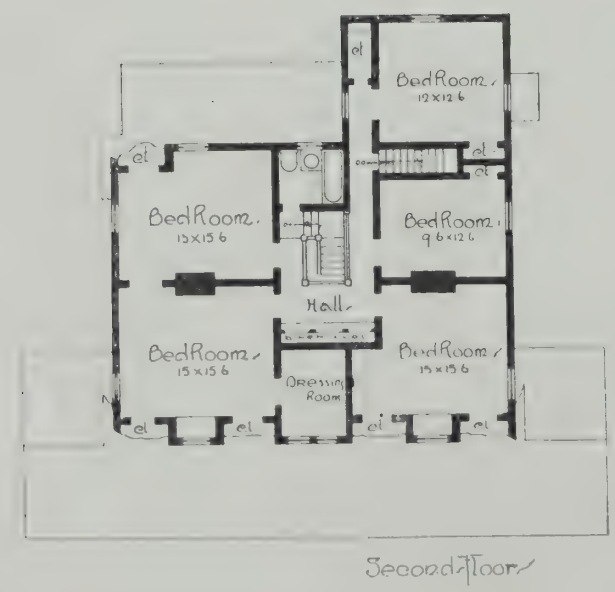
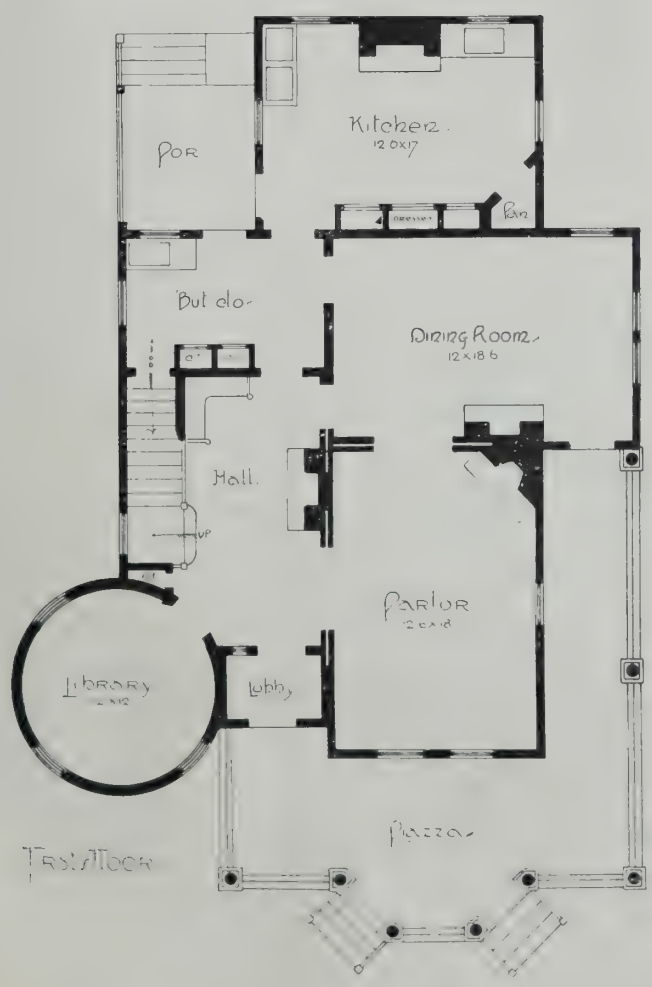
"FIELDSTONE," A RESIDENCE AT SCRANTON, PA.—See page 75.





BOSTON PUBLIC

A MODERN RESIDENCE AT HACKENSACK, N. J.—See page 87.



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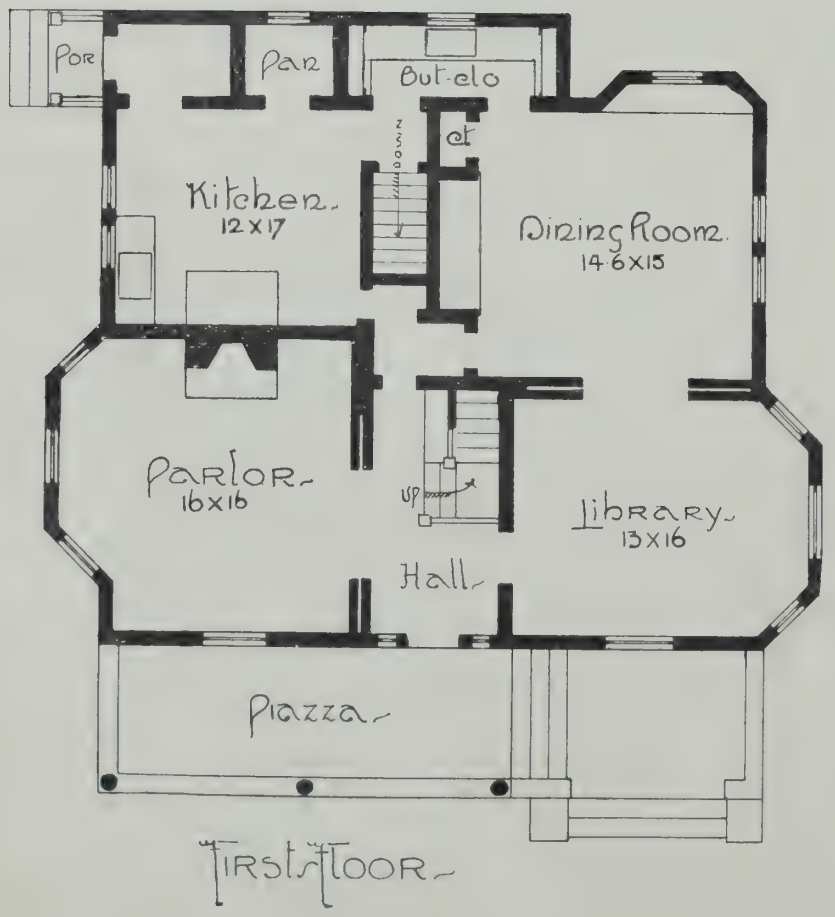
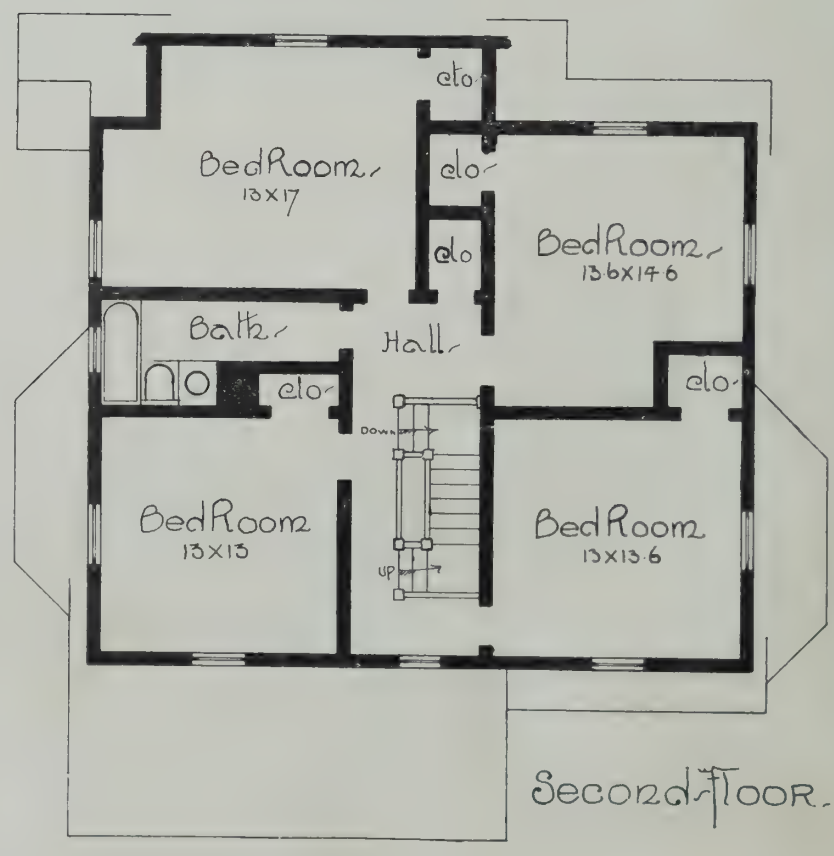
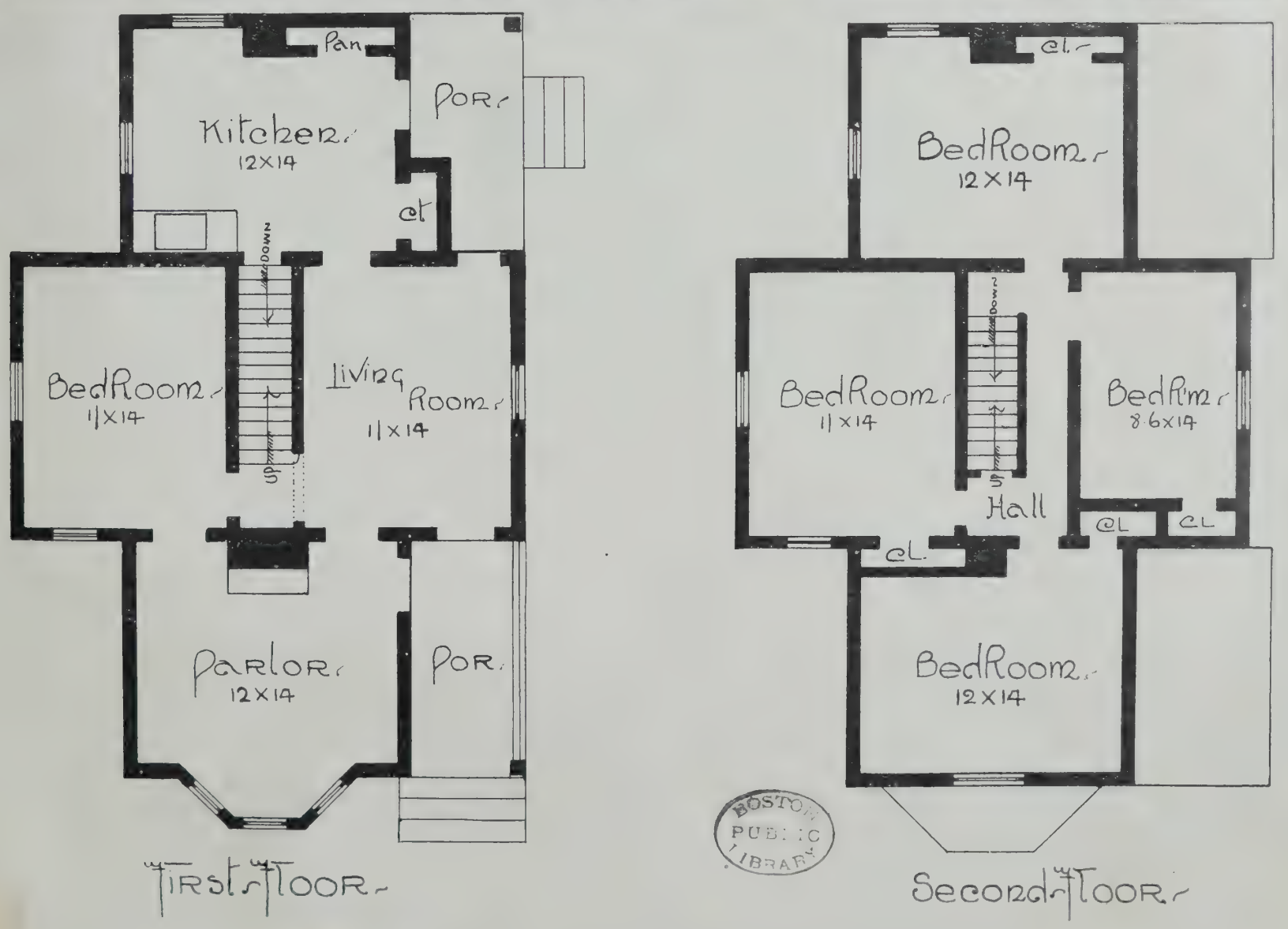
A MODERN DWELLING AT JAMAICA, LONG ISLAND.—See page 79.





A GAMBREL ROOF COTTAGE AT NEWTON CENTRE, MASS.—See page 74.



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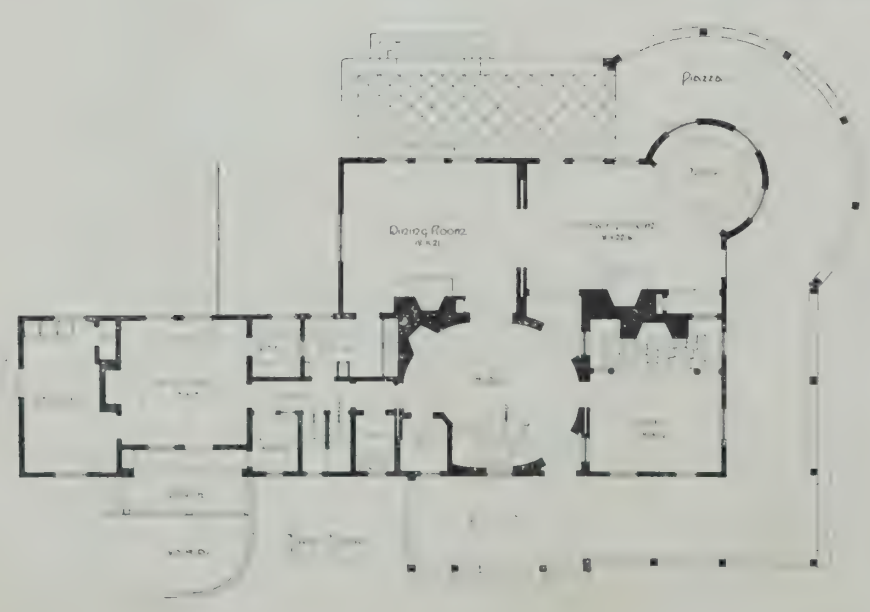
A WORKINGMAN'S COTTAGE AT LESTERSHIRE, N. Y.—See page 79.



A SUMMER RESIDENCE AT MANCHESTER-BY-THE SEA, MASS.—See page 74.

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A MODERN RESIDENCE AT HACKENSACK, N. J.

We present herewith, in this issue, on page 82, a residence which has been erected for Frederick W. Pangborn, Esq., at Hackensack, N. J. The illustrations present a design of the gambrel roof order with colonial detail. One of the principal features is the spacious piazza. The underpinning is built of red brick, laid up in red mortar. The exterior above is covered with shingles and stained a dark red, while the trimmings are painted cream white. The roof is shingled and stained a dark green. Dimensions: Front, 40 ft.; side, 42 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft. The hall and parlor are trimmed with white pine, treated natural, and each is separated, one from the other, by massive fluted columns of the Doric order. The hall contains an ornamental staircase turned out of oak. The parlor has an open fireplace, built of buff brick, with hearth and facings of same, and a mantel shelf. The library has a paneled ceiling, and an open fireplace built of red pressed brick, with hearth and facings of same, and mantel bookcases are built in on ei her side of fireplace. The dining-room, trimmed with natural white pine, has a bay window thrown out, door opening out upon porch, and an open fireplace built of mottled Tiffany brick. The butler's pantry, kitchen, and laundry, are trimmed and wainscoted with white pine, and they are furnished with the best modern conveniences. The second floor is trimmed with white pine, and it contains four bedrooms, l rge closets, dressing-room, bath, and servants' bedrooms with private stairway. The bathroom is wainscoted and furnished with porcelain fixtures and exposed nickel-plated plumbing. The hardware throughout is of wrought iron, while the chandeliers and gas fixtures are of similar material and of rich design. The floors on first story are laid with quartered oak. The third floor contains ample storage room, with trap door entrance Cemented cellar contains furnace and other necessary apartments. Cost $5,000 complete. Mr. Charles N. Hoar, architect, 52 East Twenty-third Street, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT DEVON, PA.

We present herewith in this issue, on page 77, a residence which has been recently erected for Mr. Twaddell, at Devon, Pa. The engravings illustrate a design of unusual beauty in its treatment, of a rambling character, with graceful lines, and including many unique features. The underpinning is built of rockfaced stone of a reddish gray color; the other stonework, where shown at balustrade and chimneys, is built of similar stone. The first story is treated in the half-timbered style, with the spaces filled in with plaster-work, while the beams are painted The second story is covered on the exterior les, and left to finish a natural silvery gray roof is shingled in a similar manner. Dimensions: Front, 71 ft.; side, 29 ft., not including piazzas. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The entrance hall is trimmed with oak, and it has a massive paneled wainscoting and ceiling beams. It contains an open fireplace built of brick, with hearth and facings of same. The staircase hall is a unique feature, being isolated, as it is, yet conveniently located. The parlor is treated in ivory white, it is spacious in dimensions, and it contains a pleasing nook with paneled seat, and an open fireplace trimmed with white enameled tiling and mantel. The dining-room is trimmed with oak. It has a paneled wainscot, tiled fireplace, and a china cabinet built in at one end of the room, with leaded glass doors. Rear hall, kitchen and pantries are trimmed and wainscoted with white pine, and are furnished up with the best modern fixtures complete. The laundry is also fitted up in a similar manner. The second floor is trimmed with white pine, and it contains four large bedrooms closets, and bathroom. The fireplaces where shown are treated with tiles and mantels. Bathroom is wainscoted and furnished with porcelain fixtures and exposed plumbing. The third floor contains two bedrooms and ample storage. Cemented cellar under whole of building contains furnace and other necessary apartments. Mr. William L. Price, architect, 731 Walnut street, Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT HACKENSACK, N. J.

We present herewith, in this issue, on page 78, a cottage erected for R. M. Goodheart, Esq., at Hackensack, N. J. The engravings present a design for a cottage which is of a popular style, and it combines both pleasing elevations and well arranged plans. The elevations are treated of modern style, with colonial detail, and they are well ornamented with octagonal projections, tower, porch, balconies, and windows. The underpinning is built of red brick, laid up in a neat manner. The exterior framework is sheathed and papered, and then covered with clapboards and shingles; the clapboards are painted a light gray, with trimmings of another shade, while the shingles are stained in harmony with the rest of the paintwork. The roof is shingled and painted a deep red. The blinds are painted a bottle green. Dimensions: Front, 29 ft.; side, 47 ft., including piazza and porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The principal rooms are connected by double sliding doors The hall is finished in ash, and it contains an ornamental staircase turned out of similar wood, and it is lighted by a large window on platform landing. The parlor and library are neatly trimmed, and the latter is furnished with an open fireplace, built of brick, with a mantel of unique design, and mirror. The dining-room is trimmed with whitewood, finished natural, and it is of octagonal proportions, with china closet in corner. The kitchen and pantries are trimmed and wainscoted with white pine, finished in oil. The kitchen is provided with wash-trays, sink, and stairway to cellar and to second floor. The pantry is fitted up with shelves, drawers, and dresser. The second floor is trimmed with white pine, and finished natural. It contains four bedrooms, with large closets, bathroom, and one servant's bedroom. The bathroom is wainscoted and furnished with the best sanitary plumbing. The floors throughout, both on the first and second floors, are laid with narrow North Carolina pine. There is ample space for two bedrooms on third floor, besides ample storage, if desired. Cemented cellar contains furnace and other necessary apartments. Cost, $3,000 complete. Mr. Wm. A. Lambert, architect, 99 Nassau street, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

Summer Houses.

BY WILLIAM H. WINSLOW.

Year by year the country becomes more thickly planted with summer houses, whose site has been determined by the beauty of their surroundings. But as they too commonly disfigure these as well as one another it seems to be only a question of time when nature's charm shall be seriously impaired, with no corresponding gain in point of landscape art or architecture.

VIEW OF STABLES AT MANCHESTER-BY-THE-SEA, MASS.—See page 74.

The cause is plain: People build to suit their convenience, their vanity, and their pockets, and not for ideal ends, and least of all, unfortunately, with a view to their neighbors' pleasure or benefit; thoughtless or ignorant of the fact that modest beauty, utility, and economy are equally within the reach of any one who can afford an honestly built house, fitting his need, and in accordance with the simple primary principles of refined building—in other words, architecture.

It may be said good architecture is costly, requiring expensive material, much labor, and elaborate ornamentation, and that beauty must be well paid for.

This is the commonest mistake, yet of costly houses not one in a thousand successfully combines fullness of use and beauty, while as a rule the homes of the poor throughout the world do so combine them in their humble way. As in some other matters, the attractiveness of a house is a question of quality rather than of quantity.

Beauty is one of the surpassing gifts which are offered to all men, without stint, whether they will or not, to rich and poor alike, with no labor or thought on their part, and therefore they must need it.

Clouds and sunsets, the sea and the mountains, and the endless aspects of external nature, the faces and forms of men and women, and flowers, and birds, all assure us that beauty is at least as much our birthright as meat and drink and shelter. In Ruskin's words, "There is not a

moment of any day of our lives when nature is not providing scene after scene, picture after picture, glory after glory, and working still upon such exquisite and constant principles that it is quite certain it is all done for us and intended for our perpetual pleasure."

It would then be strange, seeing that this gratuitous beauty is everywhere within reach, if in our every-day necessities, such as that of housebuilding, we must pay too dearly or go without it; that it should come to us unsought, yet flee when we would have it as a household guest.

Is it not more sensible to believe that for daily use also beauty is to be had on reasonable terms, if we take a little trouble to know what they are?

What is it, then, that constitutes the beauty of a house, a country house—those in the city being usually mere segments of houses?

Is it the fitness of means to ends, the good and sensible underlying idea, as well as the form and color, and proportion of parts to the whole, and not costly material and labor, and so-called ornament?

If this be the case, the spending of money will not secure beauty, but the exercise of common sense and independence and taste. Without these qualities in the builder, his house cannot fail of being an unhappy experiment, an injury to every beholder.

Wholesome soil, shelter from storms, a pleasant view, abundant water, and easy access, are, of course, desirable for the site of any dwelling, and these being had, there follows the consideration of its general form, which should be compact, yet long and low, contrary to general American usage. It is important that from every point of view it should present an equally good appearance, with well balanced but not too symmetrical masses, and agreeable outlines, like a range of hills.

Another thing to think of is, whether a house must stand upon a slope or a level, upon a mountain or in a valley, each position requiring a difference of form.

The nearest materials should be used, if possible both for economy and looks, and certainly the general style of the oldest houses ought to be followed in preference to eccentric novelties, if there are any good old houses in the neighborhood. This is because, having held their own for fifty or a hundred years, they are probably well built and appropriate, embodying much experience of local climate and needs. Also because a new house never can look better than when it falls naturally into its place, and does not advertise itself to all the world as brand new, being in keeping with other houses and its surroundings.

Among the latter are to be reckoned woods, bodies of water, shrubbery, seashore or open country, which the architect should consider carefully, that these may become, as it were, a part and parcel of the house, and the house of them.

A paragraph from *Garden and Field*, describing a certain seashore house and its grounds, is pertinent:

"The house, which stands close to the rocks, is very large, but long and low, as it should be, to harmonize with the level of the ocean and shore. . . . Its roofs are red, and its walls are of gray weather-colored shingles; and it is covered with vines chiefly Japanese ivy and honeysuckle, and set close about with shrubs to a degree which suffices to bind it agreeably to the soil and prevent any look of bareness, and yet does not destroy its character or give it the air of being smothered in foliage. With this exception, nothing has been done to the place except to plant vines also along the low stone wall dividing it from the highway, and to cover its slightly rolling expanse, here and there broken by low masses of rock, with well kept grass. No result could be more simple; but in such a situation it is beautiful."

The editor then described an adjoining absurd and incongruous house, which would seem to be an object-lesson of everything to be avoided, but apparently he fails to draw one conclusion which has been forced upon the writer, namely, that as a matter of public taste and well being, every country and seashore house not having much land, should be isolated from just such architectural abominations, which may crop out near them, standing toward the centre of their grounds, being screened and framed by trees and shrubs so as not to interfere with the prospect.

In this way the ugly building is more or less hid, and the attractive house shielded, and both measurably harmonized and massed when viewed from a distance.

The allusion to "weather-colored shingles" testifies to a return to a sensible usage of our New England forefathers, shingling being a rational and clapboarding an unscientific and extravagant sort of wall covering. Shingles are relatively free from decay, owing to their openness to the air. They are easily replaced, and insure covered joints, and if unpainted last longer, while just the contrary holds as regards clapboards, to say nothing of the cost of repainting these.

What passes for lead paint is now mostly barytes, which lacks the preservative quality of white lead, and is merely a make-weight and an adulterant.

Apart from this, nature's weather-brush, with which she paints tree trunks, bowlders and shingles alike, is incomparably more beautiful than any house painter's that ever was or will be, and costs nothing but a little patient waiting.

A method of building suited to our climate and conditions, which unites durability and economy, though not so cheap as shingled wall-surfaces, is plaster and timber, or half-timber construction, whereby the house frame is seen, or appears to be seen from without, dividing the outer walls into irregular panels, which are filled in upon some sort of lathing with mortar, cement, and fine stones

This method of construction, not uncommon in Europe, is yet little used here, perhaps owing to a notion that it is not secure from our weather. Waterproof clay tiles are doubtless one of the best of roof coverings, but until they become cheaper they cannot come into general use here, as they have in so many other countries.

It is impossible to write intelligently as regards the question of ornamenting houses each building needing its own treatment. One might as well try to give reliable information concerning medical treatment; "every man his own architect" being as absurd if not as dangerous as "every man his own doctor."

Ornament is the rock on which many a building venture makes shipwreck, and not a few would-be experts, born with a deficient sense of form and color, fail in their use of it. On the whole, perhaps, the best thing to be said is that the less there is, the less likely it is to go wrong, and that it should serve a definite purpose in accordance with its accompanying construction.

Crude sawed work, coarse turning and carving, beaded and bulging columns, flimsy balustrades and distorted brackets in strange places, and fantastically cut shingles are the particular thorns in the flesh which now and here tease and torment those who know something of good taste and good architecture.

Such things are no more ornamental than the tattooing of a hand, a wasp waist, banged forelocks, or hair cut to a straight edge with the aid of a wooden bowl, and as such fashions have had their day, so will the fashion of cheap and meretricious building have its day, and be forgotten when our art development shall have passed its juvenile stage.—*Boston Commonwealth.*

Speculative Building.

However considered, speculative building is risky, not only for the principal operator, but more particularly for the sub-contractors. Some persons go so far as to characterize speculative building as a species of systematic thievery. So much of scandal attends speculative operations, that this characterization is sometimes richly deserved. The methods that are resorted to by which the sub-contractor and the material man are handicapped and cheated are too numerous to mention in detail. Reference to a few of the leading features, however, will not be without interest to our subscribers.

While sometimes an operation begun in perfect good faith, but with little wisdom, falls into a form of liquidation, similar to that which is employed by the tricksters in the building business, in the majority of cases the operation is begun with the deliberate intention to cheat and defraud as many people who can be drawn into it as is possible. Some of the firms engaged in building-loan operations and real estate speculations in New York city are notorious as swindling operators. There are others, however, who are only a little less daring and audacious as swindlers, but who are less known to the public. Frequently a swindle is operated as follows:

There is purchased a vacant plot or old property for improvement. It is taken over at a grossly inflated valuation by some builder, with a loan for its improvement, which is secured by a mortgage. The foreclosure of this mortgage at some stage in the operations when the builder has become involved in debt to sub-contractors, workmen and material men, is the broad plan upon which the various liabilities are wiped out. By this foreclosure, unless the creditors are able to step in and buy the property and afterwards sell it for as much as or more than they paid for it, all the security of the creditors, except their personal recourse against the builder, is wiped out.

In an operation of this kind, the builder must, of course, be utterly irresponsible. Indeed, responsible builders do not go into such operations, because creditors would have recourse to them and they would be the losers. The course of dishonest building, however, has run so long in this city that there is now no lack of men who will answer the requirements of the case, even though they do it under fictitious names. The intended victims are wary, for most of them have had their fingers burned in former experiences; but competition in their own ranks, honeyed if non-committal replies from the mortgagees, and the strenuous desire to do business, lead them in the end to extend important credits, hoping always against their better judgment that in this case it will be all right.

The following description of operations of this kind from a man of many years' connection with the building business, will be of interest to our readers: "The material men are often the victims of their eagerness to do business. They are constantly changing salesmen in the belief that all that is necessary in a salesman is a hustler who will bring in the orders. An experienced man soon becomes acquainted with the builders who are not deserving of credit, and learns to avoid them even when he finds them operating under new aliases. But a fresh salesman, anxious to increase his commissions, will avoid scrutinizing a man's credit too closely, and if the firm receives the order from a new name, though it may conceal an old swindler, they will take the chance, hoping, if their proper fears are realized, that they may at last find security in a mechanics' lien. If they make inquiries of the mortgagee, he usually tells them the property was sold for a sum far above the amount of the mortgage; that the owner will have a very valuable equity in the property; that the building loan is payable in installments as the work progresses, and that in his or their opinion they will run no risk of a loss. This satisfies the average material man, and he goes on furnishing materials and labor until time comes for a payment on account. Most of the time there is a prompt first payment on account, and the material man is lulled into perfect security. He goes on with his work, though the second payment is tardy and deficient, and finally, when the building is nearly completed and he has gone far beyond his original intention in the credit line, fails to get any response to his duns.

"About this time he learns that other material men, sub-contractors, and mechanics, are similarly involved with himself. Perhaps the builder declares that there is money due him from the mortgagee and he cannot compel payment. The mortgagee replies that the builder has not complied with his contract. The contract has been drawn with special view to this pinch, and is harder and sharper than a steel trap. The mortgagee orders the builder to proceed with his contract, the builder refuses or is unable to do so, for the limit of his credit has been reached, and in a little while the mortgagee begins foreclosure proceedings. Then the victims find that the mortgage debt is greater than the value of the property. It was made so by the fraudulent character of the sale to the builder.

"The builder in such a case goes in, fully knowing that he will fail in the operation, and that somebody is going to be swindled. He only knows that he is going to get all out of it that he can. This is done when one or other of the partial payments is made on his loan. He receives the money, and if the operation had not been conceived in iniquity, he would pay it to his creditors. If, also, the mortgagee did not know from the beginning that the builder was going to get his profit out of the transaction and leave his creditors in the lurch in this way, he would require him to produce receipted bills from his supply men and sub-contractors or to give drafts to pay his bills to them. But the mortgagee's concern is only to know that more material and labor have gone into the building than have been paid for, and that if the job should stop and the mortgage be foreclosed, he would have more by some thousands in the property than was represented in his mortgage debt.

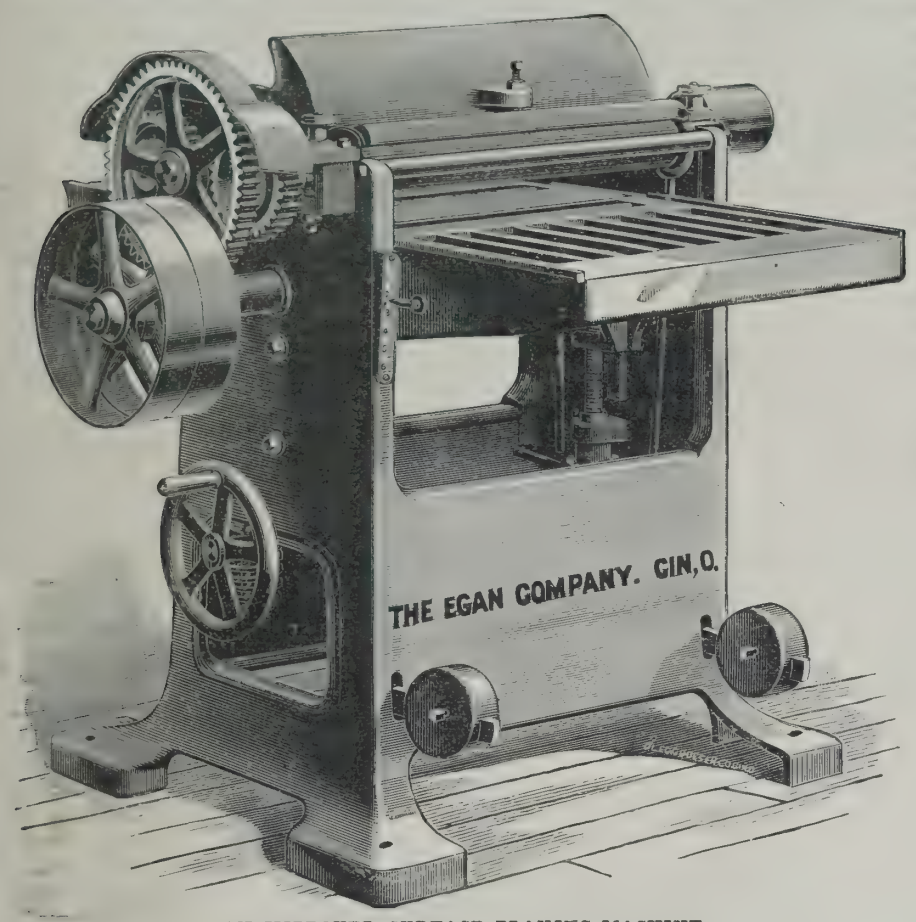
"Of course, it is possible for a merchant or contractor to avoid serious loss in these swindling operations, but it is only by keeping out of them; and so many tricks are resorted to, so many promises made, so many alluring prospects held out to them, that they are led in almost before they know it. And in the end they place their trust in the mechanics' lien law, hopeful that the 'owner' may be something more than a myth or than the mere confederate of a mortgagee, whose mortgage is like charity in one respect at least, that it 'covereth (up) a multitude of sins.' Very often, however, he finds that just when the lien law ought to be a protection to him it fails, and that is the general experience. It 'works' where there is no necessity for it, against honest men who mean to pay their debts anyway, and it fails to work against dishonest men, because they can circumvent it by the excessive mortgage and collusive scheme that has been described."—*Sanitary Plumber.*

Screws in Stone Walls.

A Dusseldorf engineer, knowing from experience that wooden dowels for the purpose of securing screws in stone are apt to weaken the walls, and do not afford the desired solidity, has devised an ingenious method of obtaining a firm anchorage. For this purpose a wire of suitable thickness is coiled on to the screw, so as to follow the threads of the same and to form a kind of screw nut. The coiling may commence near the head or thick end of the bolt, and proceed toward the point by laying the wire into or between the threads, so as to touch the bottom of the same, the section of each screw thread being preferably triangular or trapezoidal, and the core of the screw conical (similar to a wood screw). After arriving at the point of the screw the wire may be wound backward over the helix already wound on, but with a steeper pitch, so as to leave wider interstices between consecutive convolutions of the wire. After the wire has been laid on so as to form a nut, and then the screw withdrawn, the nut or wire coil is introduced into a hole which has been drilled or otherwise formed in the wall for this purpose, and which is slightly wider than the diameter of the nut measured over the outer layer of the wire, after which the interstices are filled up with plaster-of-Paris cement, or similar binding material in a plastic condition. When the said binding material has become sufficiently hard and firm, the screw bolt which has served as a core, or another screw bolt having the same diameter and pitch, is screwed into the wire coil, and may now be screwed out and in repeatedly.—*Philadelphia Record.*

HIGH-CLASS WOOD-WORKING MACHINERY.

The manufacturers of the machine shown in our illustration present it as the highest sample of excellence yet attained on light surface planers, which they have improved and perfected year by year, as experience and practical use by experts suggested. It is heavy, and the iron is distributed where it does the most good. It is really a big planer in a small way, and will take a fine finishing cut, doing the very smoothest work; a few

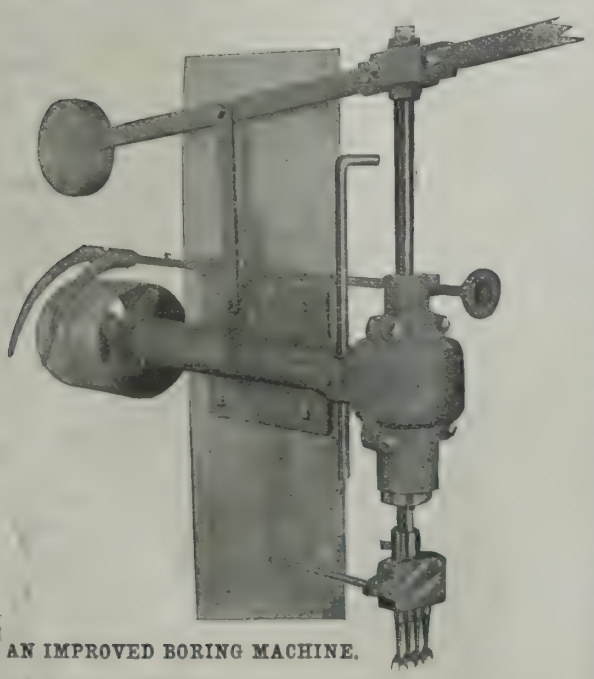


AN IMPROVED SURFACE PLANING MACHINE.

turns of the wheel raises the bed, and a cut 5/8 in. deep in hardwood can be taken. The frame is adapted for strength and strain, and is cast all in one piece. The bed is also cast in one piece, and the way it is dovetailed into the frame makes it the stiffest machine for all kinds of hard and soft lumber, and enables it to make a cut entirely free from ridges. The bed is strongly gibbed to the frame, and any wear can be instantly taken up by bolts from the outside of frame, thus insuring great durability and the very best of work. The boxes for cylinder, being cast on machine, make a very solid and rigid bearing, free from all vibration. The changing of the machine to cut different thicknesses is quick and simple, the bed being raised and lowered by a single hand-wheel The feed rolls are adjustable, and the cylinders being in stationary boxes, when once set, are always the same, and when the bed is raised or lowered a glance at an index on side shows the thickness to be planed, and requires no further setting. For panel work, cigar box, pattern and mill work, box and planing mills, buggy and furniture factories, and especially for work requiring great smoothness, this machine is said to have no superior. It is manufactured by the Egan Company, 209-229 West Front Street, Cincinnati, Ohio, U. S. A.

AN IMPROVED BORING MACHINE.

The tool represented in the illustration is designed for all kinds of boring, the machine having a motion of 10½"



AN IMPROVED BORING MACHINE.

the spindle; the hole in the end being ½" in diameter, which is the size of the ordinary bit shank. A stop rod is provided, which allows boring holes at uniform depth. The lever which draws the spindles down is counterbalanced with an adjustable weight, so that the spindle always stops at the top of the stroke. The main casting is babbitted, which forms a very long bearing for the main shaft, which carries on one end a 7" tight and loose pulley, and on the other end a mitre gear 3" in diameter. This mitre gear engages on a similar gear which is carried by the sleeve journal in the box on the front of the machine. The drilling spindle has a spline in it passing through this sleeve, having motion imparted to it by the same. The shifter is arranged conveniently, so that the belt can be run direct from the line shaft onto the machine, avoiding the necessity of putting up a separate countershaft. The machine is manufactured by the Fox Machine Company, Grand Rapids, Mich., is very compact and well built, and is sold at a price to meet the requirements of planing mills and the wood-working trade.

Wood Workers' Tools.

The catalogue of tools, supplies, machinery, etc., for carpenters, builders, cabinet makers, pattern makers, millwrights, carvers, ship carpenters, inventors, and a thousand different handicraftsmen, recently issued by the Chas. A. Strelinger Company, Box 12½, Detroit, Mich., is not only a neatly bound and handsomely illustrated book of some 400 pages, but it is also a useful handbook, explaining a great deal about the use of tools, and showing the best way of doing many kinds of work. It is furnished, bound in cloth, for $1, and in flexible linen for 25 cents. It is of a size not to be in the way on the desk or bench and may be carried about by the workman in his pocket. The same firm also issue a metal workers' catalogue under the title of "A Book of Tools," so that the variety of goods to be obtained of the house is almost unlimited; and in their catalogues they not only give one or two kinds, but often a dozen kinds of tools for the same work, with such comments and details as will enable the purchaser to make a most intelligent choice. In the last portion of this catalogue is a concise treatise on the elements of descriptive geometry as applied to the trades, giving the methods of finding the different lengths and bevels in carpenter work, sheet-metal and iron work, with instructions for making cross and detail sections of work, and containing, also, builders' estimates, blank forms of specifications, bonds, contracts, etc.

Graphite in Paints for Iron Work.

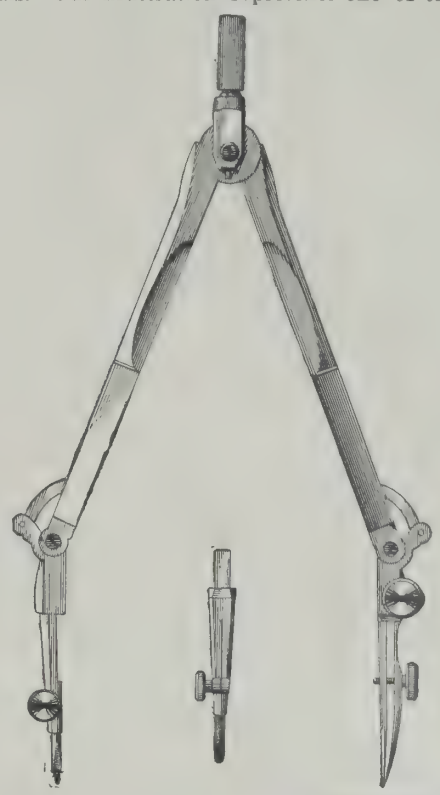
Much has been said and written lately concerning protective coverings for iron structural work. The growing tendency among those who have given the matter careful consideration, is to add some form of carbon to the red lead used, or to discard red lead altogether. The Joseph Dixon Crucible Company, of Jersey City, N. J., have, therefore, issued a most instructive pamphlet, presenting a wide array of facts and much expert evidence relative to the subject.

AN IMPROVED HOT AIR FURNACE.

The illustration represents a furnace, differing from most of the hot air furnaces that are now on the market, in that the radiator consists of tubes placed around the circumference, being placed close together at the back, and further apart as the mouth of the radiator is reached. The cold air passes up inside the tubes, and the gases pass around and out on the outside of the tubes, thus securing especially good combustion. This furnace has had remarkable success ever since it was put on the market, about ten years ago. It is constructed with or without the hot blast fire pot. This hot blast is a contrivance for introducing heated air into the fire pot, with the idea of increasing the combustion of the gases. It has been thoroughly tested with all kinds of coal. The fire pot is a double one; the hot blast door can be placed at any point to suit convenience for attaching draught chain. The air entering the door divides and passes between the outside middle pot ring and inner fire pot to a point opposite the door, then rises and passes between the upper outside pot ring and inner fire pot. The air is discharged into the combustion chamber through openings at the top of the lower fire pot ring, and also directly under the dome, thereby uniting with the gases, and forming a most perfect hot blast. It is an all cast iron construction, and no bolts used. The hot blast attachments can be put into any Palace King, Palace Queen, or Palace Duke Furnaces, made by the firm since 1888, at but slight expense. These furnaces are made by Russel Wheeler & Son, Utica, N. Y.

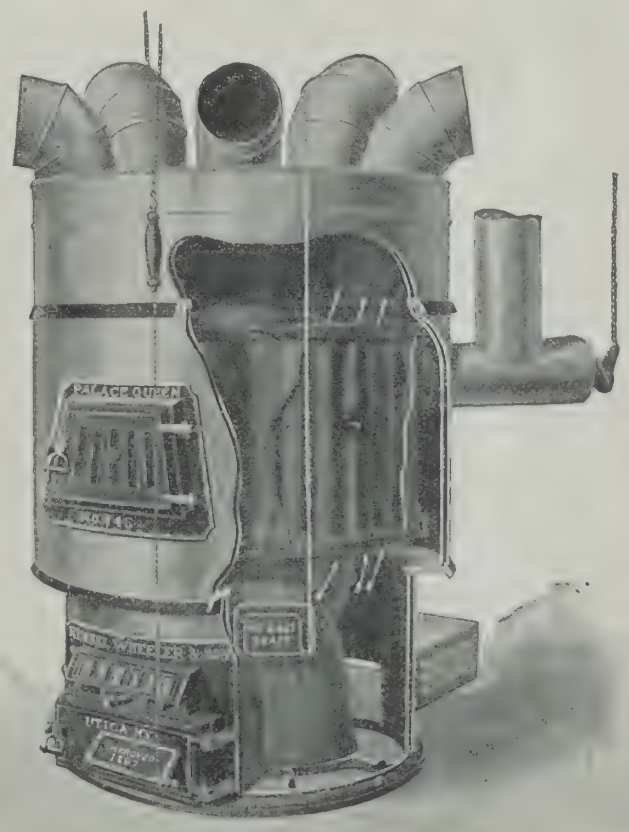
ARCHITECTS', ENGINEERS' AND DRAUGHTSMEN'S SUPPLIES.

In a neat little illustrated price list of 250 pages, Messrs. F. Weber & Co., of 1125 Chestnut Street, Philadelphia, Pa, present a very extensive list of instruments and supplies, including many new specialties, and embracing almost everything that can be called for in a draughting-room, as well as instruments for school, manual training and college use. The business has been established over forty years, and the firm issues another catalogue of their goods devoted especially to artists' materials. Our illustration represents one of their ex-



RIEFLER'S SELF-ADJUSTABLE PARALLEL COMPASSES.

tensive line of Riefler's patent German-silver drawing instruments, introduced in this country some ten years ago by Messrs. Weber & Co., since which they have obtained wide popularity. The testimonials these instruments have received from eminent engineers and architects, and from draughtsmen of the highest proficiency, cannot but be exceedingly gratifying to the firm, although they manufacture and supply many other kinds and grades of instruments.



THE PALACE QUEEN HOT AIR FURNACE.

Improved Sliding Window Blinds.

The recent edition of a catalogue gotten out by the Hartman Sliding Blind Company, of Crestline, O., shows many new and useful improvements on their popular sliding blinds, together with sectional details of construction, which in variety will meet all demands. These blinds have gained a wide reputation for simplicity, durability, and beauty, and are giving universal satisfaction to those who have tried them. One of the important improvements r cently made on the blinds is their slat springs, by means of which the rolling slats are held in position at any angle the operator may desire to set them. The wind cannot throw them open or close them, neither will a sudden jar or a blast of wind throw them out of the desired position, yet they are easily operated by the hand. The necessity of good ventilation in buildings of all kinds is so apparent to all, that anything which aids in obtaining it is readily welcomed by architects, clients, builders and contractors. Another feature is the elliptical spring they use to sustain the blind in the window; the spring, after all, is the important part of a sliding blind; the blinds may be ever so well constructed and nicely finished, but if the spring does not properly hold them in position, and at the same time allow them to move smoothly and easily, then the whole blind is a failure. The Hartman patent friction block spring does the work successfully, and stands the test of time and usage. The spring is fastened in its centre, and on each end of it is riveted a leather friction block, and they are set at such an angle that when the spring is engaged in the grooves of the guideway, the friction blocks lie perfectly flat against the surface of same—thus friction enough is secured to hold the blind in position, and yet it does not stick fast, but is easily moved up or down noiselessly; the springs are graduated in tension, corresponding to the weights of the blind section, and in ten years of experience they have had no complaint or call to replace springs on account of wearing out or loss of tension, or for any other cause, but after the lapse of this time are found to be in perfect condition. The company do not, however, confine themselves to springs alone to support and operate the blinds, but furnish a complete outfit of weights, cords and pulleys, by which the blinds are hung and balanced. They use in the construction of their blinds any kind of wood their customers may desire, and give the choice of many different styles, giving some very pretty effects in combination of panel and slat work, both rolling and stationary slats, or in all panels. Six cents in stamps sent to the manufacturers, Hartman Sliding Blind Company, of Crestline, Ohio, will secure one of their new 100-page illustrated catalogues, giving full particulars of their popular product.

The Vance Steam and Hot Water Boilers.

There is no other boiler made that for so short a time has had so many sales as the "Vance." Wherever they have been placed and tried they have given perfect satisfaction. It is a case where they sell themselves. In many instances other makes have been taken out and the "Vance" substituted. In Canandaigua, recently, against two other competitors, the "Vance" won out. The same in Auburn and Lyons. Yesterday the company shipped one of their make to Cleveland, and they have another ready to go to Butte, Montana. Another one of these heaters goes to Clifton Springs in a few days. Yesterday, for the first time, fire was placed in the boiler in the Brewer Hotel. The new Brunswick Hotel of Waterloo has been furnished with a boiler recently. Briefly, the "Vance" is one of the most economical heaters on the market. The works of this company have been increased week by week, and the end, as yet is nowhere in sight. Each week new men are added to the already large force, and still the number of orders have accumulated so rapidly that the company is forced to work night as well as day. —Geneva (N. Y.) *Courier*, September 29, 1897.

Messrs. Keuffel & Esser, of New York, manufacturers and importers of drawing materials, and mathematical and surveying instruments, have issued a pamphlet of revised prices for such of their goods as are affected by the Dingley tariff which recently went into effect, and which they will be pleased to send to customers and others interested.

Waterproof Surface Compo-Board No. 1.

The original Compo-Board had a covering on each side of a heavy building paper, which in damp localities had the effect of attracting moisture. To overcome this, a new board has been placed upon the market, which has both surfaces impregnated with a substance that makes the facings waterproof, so that moisture does not enter, because all pores are filled up and securely closed by passing the boards between rollers worked under enormous pressure. These boards are 4 feet wide, ¼ inch thick, and 8, 9, 10, 12, 14, 16 and 18 feet long. The principal use for them is, as a substitute for lath and plaster by nailing the boards directly upon the studs or beams set 16 inches to centres, which, when covered with wall paper, will resemble work done by plastering. Compo-Boards are also useful for any purposes requiring large, flat, thin boards, also for repairing broken plastered ceilings. Descriptive circulars, prices, and samples may be obtained by addressing E. G. Soltmann, Compo-Board Department, 164 West Forty-sixth street, or the down-town branch, 119 Fulton Street, New York.

The Prevention of Rust in Iron and Steel Structures.

The advent of the age of iron and steel in the arts of building and manufacture brought in an element of decay which scarcely existed in the age of stone. For while we are able to build on a grander scale, and combine the new material in daring forms which the primitive ages merely dreamed of and never attempted, we cannot look upon our finished works with the same assurance of their permanence that filled the builders of the Egyptian pyramids or the temples of Greece and Rome. Often when the stone was hewn from the quarry and exposed in a building to the wear of the elements it hardened under the exposure. Nature was thus the friend of the architect, and dealt kindly with his work. The very winds and weather which colored it with the mellow tints and peculiar beauties of age gave it strength as lasting as that of the hills themselves.

But the iron and steel of modern construction are as perishable as they are strong. The action of the elements, which sometimes prolonged the endurance of an ancient structure, commences to destroy our modern works in iron and steel from the very first moment of contact. Unless some thorough system of protection be adopted, it is certain that the life of the skeleton steel buildings, for instance, which are multiplying so fast in our cities, will never be measured by centuries. The dangers of decay are serious indeed, even in the case of such ironwork as is open to inspection; for in certain climates the oxidation is so rapid that it takes a comparatively brief time to reduce the section of the metal, so that it is brought perilously near to the breaking point and far below the proper margin of safety. Notable instances of rapid decay may be found in some of the more neglected parts of the viaducts and bridges of this city, where, for the want of thorough and frequent painting, the ironwork is being eaten away under the combined attack of the moisture and salt air of our climate.

But although structural ironwork is open to the attack of an alert and ever present enemy, it is well understood that so long as its parts are open to inspection and may be reached by the paint brush, its life may be indefinitely prolonged. If they are carefully cleaned, and coated with good paint at the time of erection, subsequent inspection and repainting systematically carried out will render our iron and steel structures practically imperishable.

The introduction of the skeleton system of building, however, has brought with it new and comparatively untried problems. The methods of construction which are used to insure the integrity of the steel work are radically different; for whereas, the bridge builder is careful to leave all the parts of his structure exposed, the builder of the "skyscraper" is just as careful to cover them up. This concealment is rendered necessary in the case of the columns that carry the outside walls by the demands of construction, and the interior columns and floor girders are inclosed in the endeavor to secure a fireproof construction. The nature of this covering varies but little. It usually consists of stone or common brick, or some form of fire brick, and when the steel members are once sealed up from sight, the question of their actual condition as the years pass by is a matter for speculation, but never a matter of certainty.

It is true the columns and girders are treated to a coat of paint at the shops, and no doubt, in many cases, there is an attempt to do this work thoroughly and with a good quality of paint; but there are thousands of tons of material that go into the buildings with the work carelessly or cheaply done. And even where the steel has been honestly painted at the shops, the subsequent handling in transportation and in erection at the building does more or less damage to the paint, rubbing it off and exposing the metal. Nevertheless, there is no effort made to repair the damage, and the girder or column, as the case may be, is shut up within a porous and not always an airtight casing, in which the rusting of these exposed surfaces is free to go on unseen and unchecked.

It is unfortunate that we have very few facts to go upon in estimating the behavior of inclosed steel or iron work. This style of construction is so modern that there has not been sufficient lapse of time for any reliable data to be gathered; and such cases as have been quoted for or against the permanence of walled-in iron work are few in number and stand good only for the particular circumstances that surround them. If a column which had been built into an interior wall was found free from rust at the end of a certain number of years, it would be no proof that another column built into an outside wall and on the weather side of the building would be equally secure. And we must not argue that, because there was no oxidation of a structure in the dry air of the city of Denver, five or six thousand feet above the sea, a similar structure in the moist atmosphere of a sea coast city would escape injury.

The painting which the steel work receives at the shops should, at least, be repeated when it has been erected in place, so that any spots where the paint has been chipped or rubbed off, exposing the metal, may be protected from the action of the air.

In its way, this question of the rusting of covered iron work is as important as that of fireproofing; but it is not likely that it will receive the same careful attention; for the reason that, while the latter question is one of ever present, vital importance, the former is slow in its action and affects a more or less remote posterity. And yet, if there are duties which we owe to posterity, surely this is one. If, by a little reasonable care, and an expense only slightly greater than that which is at present incurred, the costly buildings of to-day may be saved from a possible ultimate collapse, the care should certainly be taken, and the expense incurred.

The Air of Bedrooms.

When there is too much water in the atmosphere, the person who breathes it is to a certain limited extent deprived of his due supply of oxygen, and an elementary beginning of suffocation is perceived in his chest, says the *Hospital*. Most middle-aged and all old persons have felt this; and all persons also who have weak hearts or impaired lungs. Now the air of bedrooms is exceedingly liable to be overcharged with watery vapor. The most obvious reasons for this are that many bedrooms are never warmed with fires, and that their windows are often left open all day until dusk, and sometimes even to the very hour of going to bed. Let us think of some of the consequences of going to bed in very damp air. A delicate or an aged person leaves a warm drawing-room, say, at half-past eleven, a drawing-room in which there was a temperature of sixty-eight degrees; he enters a cold, damp bedroom, say at a temperature of thirty-eight degrees. The air in the drawing-room was dry, perhaps a little too dry. The air in the bedroom is saturated with cold, watery vapor. The person we are thinking of, so soon as he enters the bedroom, chokes and gasps and coughs for half an hour at least, and sometimes brings on such an attack of asthma, or, as he calls it, "stuffiness" of the chest, that he can hardly breathe at all. He may even lose his night's sleep, and be ill for some days after such an exposure. Now, common sense says, "Make an effort to bring the atmosphere of the bedroom nearer in point both of dryness and warmth to the atmosphere of the drawing-room; and then not only will a man feel as comfortable in the bedroom as in the drawing-room, but even more comfortable. He will neither gasp, nor choke, nor cough, but will go to sleep with ease and comfort." Common sense teaches some people all this. But to those who have no special regard for common sense, Science tells the same tale, and she speaks with a voice whose authority not even the most learned will question.

Danger from Steel Buildings.

The true danger to be apprehended in regard to the modern office buildings of mixed steel and masonry construction is from rust. No one knows exactly how the metal in such structures is going to behave, for the reason that such combinations have never before been exposed in the same manner to the action of the elements. We know that iron buried in the heart of thick stone walls, laid in lime mortar, has remained unchanged for seven or eight centuries, presumably through the alkalinity of the lime, which has been known for ages as a powerful preventive of rust. Our high buildings are, however, built with cement instead of lime, and not much is known in regard to the action of cement on iron. Chemically, cement is much less alkaline than lime, and as it is insoluble in water, what alkalinity it possesses can hardly have much chemical effect on the metal. Its insolubility, however, makes walls built with it more impervious to water than those built with lime, and, if the steel structure is well grouted with cement, as is customary, there is reason to suppose that the metal, guarded from moisture by its impervious sheath, which, if it does not contribute alkali, at least contains no acid, may last uninjured for a very long period. Such experience as is available confirms this view, and although architects will watch with great anxiety for any signs of deterioration of metallic structures used in the new manner, as an indication which may assist in devising precautions against such action in future, they have certainly neither forgotten nor neglected anything that the present condition of knowledge affords in the way of information on the subject.—*American Architect.*

How to Find Out if a Room is Damp.

To ascertain whether or not a room is damp, a kilogramme of fresh lime should be placed therein, after hermetically closing doors and windows. In twenty-four hours it should be weighed, and if the kilogramme has absorbed more than ten grammes of water (that is more than one per cent.), the room should be considered damp and classed as unhealthy. The question of the dampness of dwellings is a frequent cause of dispute between landlord and tenant, and is naturally solved in the negative by the former. The question can be settled in the future by the test of the hydration of lime, which will give irrefutable proof of the validity of such complaint.—*New York Dietetic and Hygienic Gazette*

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INTERIOR OF HALL AND STAIRCASE, RESIDENCE AT ENGLEWOOD, N. J.—See page 105.

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THE

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TWO IMPORTANT ARCHITECTURAL WORKS IN NEW YORK.

Within a few days two important architectural commissions have been awarded in New York city. We refer to the New York Public Library and the new Academy of Design. Both of these commissions were awarded by carefully selected jurors after holding equitable competitions, and both were won by the same firm of architects, Messrs. Carrère & Hastings, of New York. Such an achievement for a single firm is unparalleled in the annals of American architecture. The competitions were most interesting, as they were of a dissimilar kind; that for the Library being in the nature of a compromise, being practically open to all, at least as far as the tentative plans were concerned; while, in that for the Academy, only a few architects of established reputation were invited to compete; but the result was the same in both cases, and the firm is to be congratulated on being able to exercise their skill on two buildings which are to be put to the noblest uses.

Architecture is not made up by the combination of picturesque "bits," and American architecture suffers to-day from ignorance and a lack of inspiration and intellectual force. There is no better proof of the excellence of the training of the Ecole des Beaux Arts than is found in the results of this training when coupled with individuality, as in the case of the firm we have referred to. They have both passed through the Ecole, and everything they do is not stamped with the earmarks of the Rue Bonaparte ateliers, but is eclectic and American. There is no truer example of creative architecture in America than is to be found in the splendid Florida Hotel, "Ponce de Leon"; while the "Life" building, and the residence of Henry T. Sloane, Esq., both of New York city, show what can be done even in a great city to raise architectural standards. We may expect for both of the new buildings dignified and beautiful designs, in which the subject will be treated in an unstereotyped, but still thoroughly scholarly way.

By the plan of the competition for the Library building, it was decided that the designers of six plans should be selected by an open preliminary competition; that such persons, and not more than six other persons or firms to be named by the committee acting on behalf of the trustees, should be invited to take part in the second competition. The jury consisted of seven persons: three practicing architects chosen by the competitors themselves, three members of the Board of Managers, and the Director of the Library. The drawings were numbered, and the jury was in ignorance as to the makers of them. Eighty-eight designs were furnished for the first competition. The twelve best designs of the first competition were awarded prizes of $400 each. Six of these designs were selected, and six architects were invited to compete.

The architects who took part in the second competition were:

Carrère & Hastings, Cyrus L. W. Eidlitz, J. H. Friedlander, Charles C. Haight, Haydel & Shepard, H. Hornbostel, G. E. Wood & G. E. Palmer, Howard & Cauldwell, McKim, Mead & White, Peabody & Stearns, Geo. B. Post, W. Wheeler Smith, associated with Walker & Morris, and Whitney Warren. Each received $800 for his design.

The jury met at the Astor Library, November 2, and the secretary of the Board submitted the twelve designs received by him. The result of their deliberations was that they awarded the commission to Carrère & Hastings. The second and third of the best designs in the estimation of the jury were submitted by Howard & Cauldwell, and McKim, Mead & White. The jury stated in their report that the design of Carrère & Hastings "fulfilled in a high degree all the requirements called for by the terms of the competition, and presented a consistent, skillful, and artistic solution of the practical and structural conditions." It was, moreover, "direct and dignified in treatment, and would give the city of New York an entirely satisfactory and practical working library, and at the same time a beautiful and monumental building."

The building will stand on a lot 482 x 455 feet square. The building will measure about 225 x 350. It is to be fireproof, and have a storage capacity for 4,000,000 volumes. The estimated cost of the building is $1,700,000, exclusive of the heating, lighting, ventilating apparatus, furniture, book stacks, shelves, and also for the expenditure for architect's fees, and for removing the reservoir. In a pamphlet issued by the trustees of the New York Public Library the various requirements of the building are specified.

The Academy of Design, by its choice location on Morningside Heights, will be as imposing as its more costly brother down in the heart of the city. It is an ideal spot for an academy of art, far away from the dust and noise of its old location. The Council of the National Academy of Design had the wisdom to call in expert advice in formulating its scheme of competition, the recommendations of the Fine Arts Federation being carried out, a reasonable sum being set apart for compensation to the architects invited to compete, and the architectural profession was represented on the jury. In this limited competition, six architects competed. They were Messrs. George B. Post, Henry Hardenburgh; Babb, Cook & Willard; Carrère & Hastings, Edward P. Casey, and Ernest Flagg. Mr. Casey sent in his plan in place of McKim, Mead & White, who were invited to compete, but declined. Each of the competitors, with the exception of the successful firm, received $500. The jury of award was composed of four academicians: Messrs J. Carroll Beckwith, Edwin H. Blashfield, William H. Hart and Frederick Dielman; and three architects, R. S. Peabody, of Boston; Charles F. McKim, and John G. Howard. The result of their deliberations was that they decided in favor of the design submitted by Carrère & Hastings, and their selection was promptly ratified by the Council of the Academy.

The new Academy of Design will occupy the entire block on the east side of Amsterdam Avenue, between 109th and 110th Streets, and will face the Cathedral of St. John the Divine, at present in process of construction. It will have a frontage of 171 feet on the avenue and 200 feet on each of the side streets, and will cost in the neighborhood of $500,000.

In character the building will be distinctly classic and monumental. The façade, as presented in the design, is quite plain, the entrance and the staircase leading to it being unadorned, save by two immense candelabra at the foot of the latter. The centre motif, however, is much more elaborate. It consists of a Doric order surmounted by an Attic, and containing several niches, in each of which is a classic statue. It is hoped that white marble will be mainly employed.

On the 110th Street side it will be two stories high, and on 109th Street, four stories high. The latter side is to be devoted to the students' quarters. On the other side there will be a staircase, with niches for many statues, leading to the exhibition rooms. A centre court, 60 feet square, covered with glass, will be devoted to statuary and works in relief. The historical galleries and museum will be on the Amsterdam Avenue side, while at the back of the building, facing the east, will be a large lecture hall. The exhibition galleries will give a wall space 1,500 feet long for hanging pictures. The trustees hope to begin work early in the spring.

THE ASTORIA HOTEL, NEW YORK CITY.

With the completion of the new Astoria Hotel, which adjoins and will be incorporated with the famous Waldorf Hotel, this city can boast of possessing the largest and most sumptuous structure of its kind in either hemisphere. The Waldorf-Astoria, as the combined establishments will be called, covers a block of ground bounded by Thirty-third and Thirty-fourth Streets and Fifth Avenue, the present entrance of the Waldorf being on the former street, and the future main entrance of the combined hotel being in the centre of the grand façade on Thirty-fourth Street.

In its architectural features and general scheme of decoration the Astoria follows the lines of the Waldorf; but in its magnitude and in the engineering problems involved in its construction it far surpasses the older structure. The external treatment follows the school of the German Renaissance, which style also characterizes much of the interior, though most of the larger and more elaborate rooms are designed in the style of the Italian and French Renaissance.

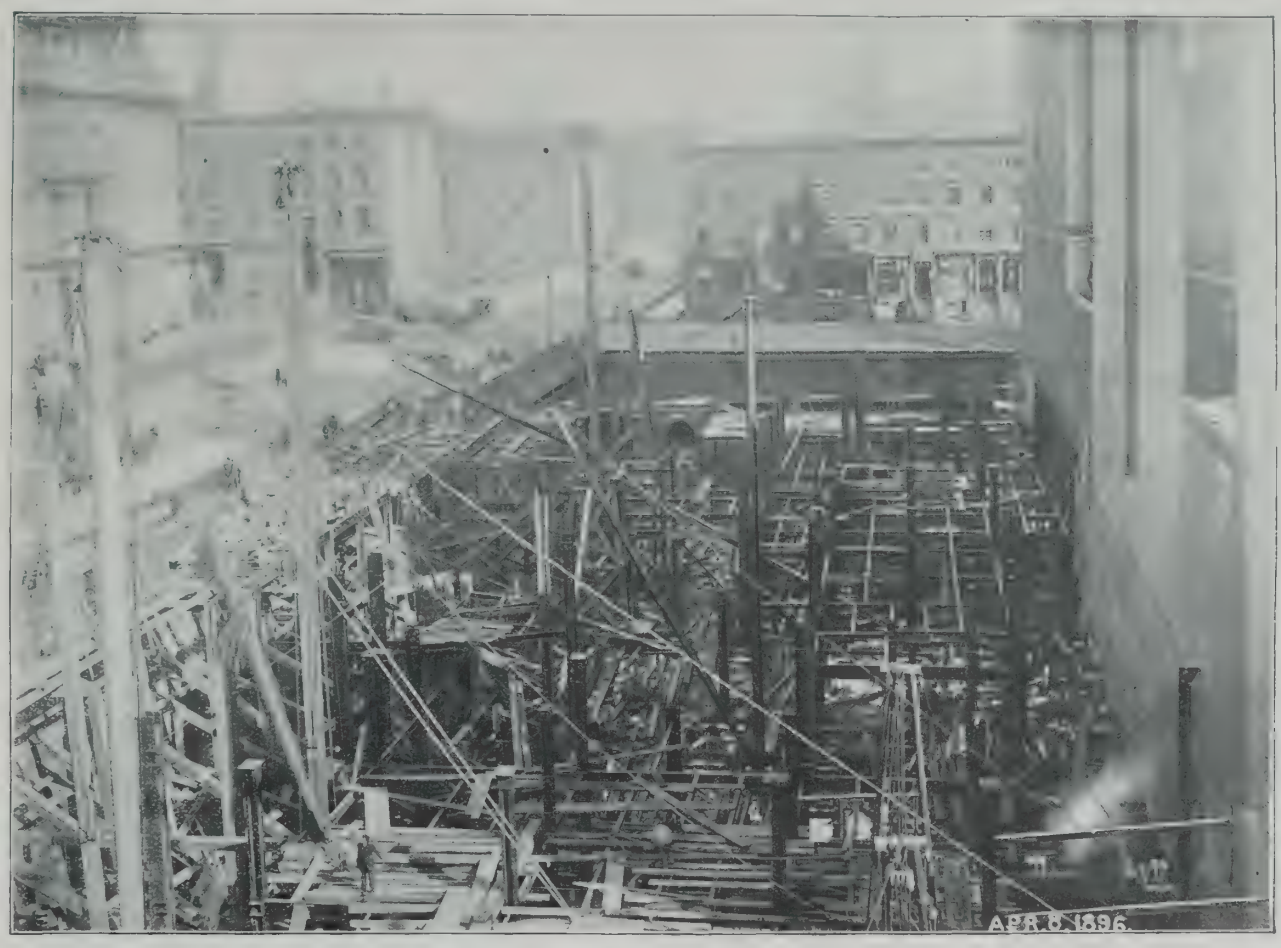
The exterior view of the combined building, with its vast frontage of red sandstone extending for 200 feet on Fifth Avenue and 335 feet on Thirty-fourth Street, would be imposing for the frontage alone; but when the eye follows through its sixteen stories to the roof line 250 feet above the curb the effect is truly majestic. No such façade was ever planned, certainly none such was ever built, either in ancient, medieval, or modern times.

The foundations were in every case carried down to solid rock, the surface of which was found at depths varying from 3 to 65 feet below the street level. As none of the foundations were less than 35 feet below the street level, a vast amount of rock excavation was necessary, and where the rock was found below the 35 foot line, the surface was leveled and concrete piers were carried up. Upon the rock or the concrete piers brick piers were built up and capped with granite, and upon these were placed the footings for the columns. It is not necessary to enter into the general structural features of the buildings, as they are of the standard type common to tall buildings of composite steel and masonry construction. There are some novel engineering features, however, which were necessitated by the great size and unobstructed view demanded for certain of the rooms, that call for special mention. The problem was to provide such rooms on the lower floors of the building and yet make provision for carrying the walls of the dozen or fourteen stories above them. The plan adopted was to erect massive steel trusses above the ceiling and incorporate them in the walls which they carried. There are two notable cases in which this has been done. The first occurs above the dining-room, which is located on the ground floor on the Fifth Avenue front, and connects with the dining-room of the Waldorf. The two rooms will be practically thrown into one, making a vast hall 50 feet wide by 200 feet long. There is a row of columns down each side of the room, the columns standing 6 feet out from the walls. The remaining 38 feet of width is entirely unobstructed by columns, and to carry the great weight of the transverse walls

above the ceiling, three heavy steel trusses were thrown across from wall to wall. Each truss is 26 feet 8 inches deep and 51 feet 7 inches long, and it is built into the wall which it carries.

Another and even more remarkable structural feat was carried out above the great ballroom, which is situated at the western end of the building. The room measures 85 feet by 96 feet, and extends in height through three stories. The two immense trusses for the ball room had to be made heavy enough to carry the concentrated load of the walls overhead, and as these walls extended through twelve stories, the loads to be provided for were unusually heavy. Each truss measures 84 feet 9 inches between the end piers of the bottom chord, and is 51 feet 3 inches deep, the top chord being at the level of, and built into, the fourth floor above the ballroom ceiling. The lower chord consists of four rows of massive eye-bars 2 1/16 inches thick by 12 inches deep, with 10-inch pins, the pins at the end posts being 12 inches diameter. The lower half of the end posts is extremely heavy, being made up of 10¾ by 29½ inch webplates, two 1½ inch by 36 inch cover plates, and 12 angles ½ inch by 4 inches by 6 inches. The two trusses are placed 14 feet 6 inches apart, and they are connected by diagonal sway bracing. When it is borne in mind that the whole of this truss-work had to be so placed that it would lie within the plane of the walls, and its various members so disposed that they would not interfere with the various corridors and halls of the upper rooms, the work reflects great credit upon the architect, Mr. H. J. Hardenberg, and the engineers, Messrs. Purdy and Henderson.

Before leaving the structural features, we draw attention to the photograph showing the massive girder, 7 feet deep, which carries the western end of the big trusses above mentioned. The line of the columns changes at the fourth floor, those above this level not coinciding with the columns beneath. In order to transfer the column loads a line of massive girders was introduced, which varies in depth from 4½ feet to seven feet. The ends of the two big trusses rest upon this girder, which receives one-half of their load. The massive column seen below the girder takes the greater part of this transferred load, and is the heaviest in the whole building. The lower section of it carries a load of 5,400,000 pounds, and its weight for 30 feet of its length is 46,980 pounds. There are over 1,600 tons of plate girders in the building, and the total amount of steel work is over 10,000 tons. We are informed that this represents only one-tenth of the cost of the building—a remarkably low figure when we bear in mind the unusual problems involved in the construction.



WORK IN SUB-BASEMENT OF THE ASTORIA HOTEL.

It has been the aim of the designers of the Astoria to make it something more than the conventional hotel. The manager, Mr. George C. Boldt, who has contributed so largely to the success of the Waldorf, has embodied his ideas in the arrangements, many of them entirely novel, of the new building. He believes that when a guest once enters the hotel he should be able to find within its walls every pleasure and convenience of metropolitan life. Hence the Astoria contains a grand ballroom, a theatre, a banqueting hall, a full suite of rooms for wedding celebrations, lecture-rooms, clubrooms, and even a hall furnished especially for meetings of secret societies; and upon the roof is a literal German spa, where all the best known mineral waters of the world can be obtained, and where the guests can look down upon the city from a promenade which is 90 feet wide, over 200 feet in length, and 250 feet above the street level.

The main entrance to the Astoria is by a semicircular driveway on the Thirty-fourth Street side. The entrance porch is carried on a series of handsome red sandstone columns, the floor is of asphalt, and the panels of the ceiling overhead are filled in with green tiling. To the east of the driveway is the ladies' reception room, which measures 50 by 50 feet, and is finished in Sienna marble, with Pompeiian red as the principal color in the decorations. To the east of this is the main dining-room, already referred to. This splendid hall is 50 feet wide by 22 feet high, and extends for 92 feet along the Fifth Avenue end of the building. The decoration is in the style of the Italian Renaissance, and the row of columns of the marble "of the midnight sun" on each side of the room, together with the richly carved pilasters, produce a very imposing and dignified effect. The walls are paneled in rose Pompadour silk, and are enriched with paintings by C. Y. Turner, who painted the well-known "Triumph of Manhattan." Two of the figures are shown in the engraving on page 103. It is the intention ultimately to remove the partition between this room and the dining-room of the Waldorf, which adjoins it, and when this is done the guests will have an unobstructed view throughout the whole length of 200 feet from Thirty-third Street to Thirty-fourth Street. Passing from the dining-room by the main corridor, one enters the "Garden Court of Palms." This is similar to the well-known palm garden in the Waldorf, but has considerably more height, as it rises through three stories of the building. The garden measures 38 by 57 feet, and it is crowned by a dome-shaped roof of softly tinted glass. The walls are finished in gray terra cotta and Pavonazzo marble, and the general style of the decoration is Italian. Three sides of the court have galleries, with carved marble balustrades, and it is connected with the palm garden at the Waldorf by three handsome archways. This room will also be used as a dining hall.

The main office of the building is located directly opposite the driveway, and passing through this to the west, we find the men's reception-room, the public billiard-room and a bar and café. The café is a handsome room, measuring 40 by 95 feet; the style is that of the German Renaissance, and it is finished in English oak, with Flemish decoration. The floor above, at the western end of the building, is occupied by the great ballroom, which is certainly the most spectacular feature of this vast building. Its dimensions, if we include the promenade, are 82 by 95 feet. It is three stories high, and the clear distance from floor to ceiling is 40 feet. The style is Louis Quatorze. At the end it has a stage with a full proscenium, and a seating capacity for an orchestra of 100. The stage is removable, and can be taken away at brief notice. There are two tiers of boxes, capable of seating 250 people, and the floor has seating capacity for 1,100 people. The state boxes face the stage and form the centre of the tiers. The appearance of this room will be extremely gorgeous; ivory and rose, rich gilding and hangings of crimson plush are the prevailing fashion of the decorations. The choicest artistic feature of the ballroom is the beautiful ceiling, which has been painted by the distinguished artist, Mr. E. H. Blashfield. Two large groups of figures, grouped with the happy effect which characterizes his work, represent respectively Music and the Dance. There are over forty figures in the composition, all of which are above life size, and the central figure in each group is about eight feet from head to toe. On the same floor and at the eastern end of the Thirty-fourth Street side is a banquet hall,

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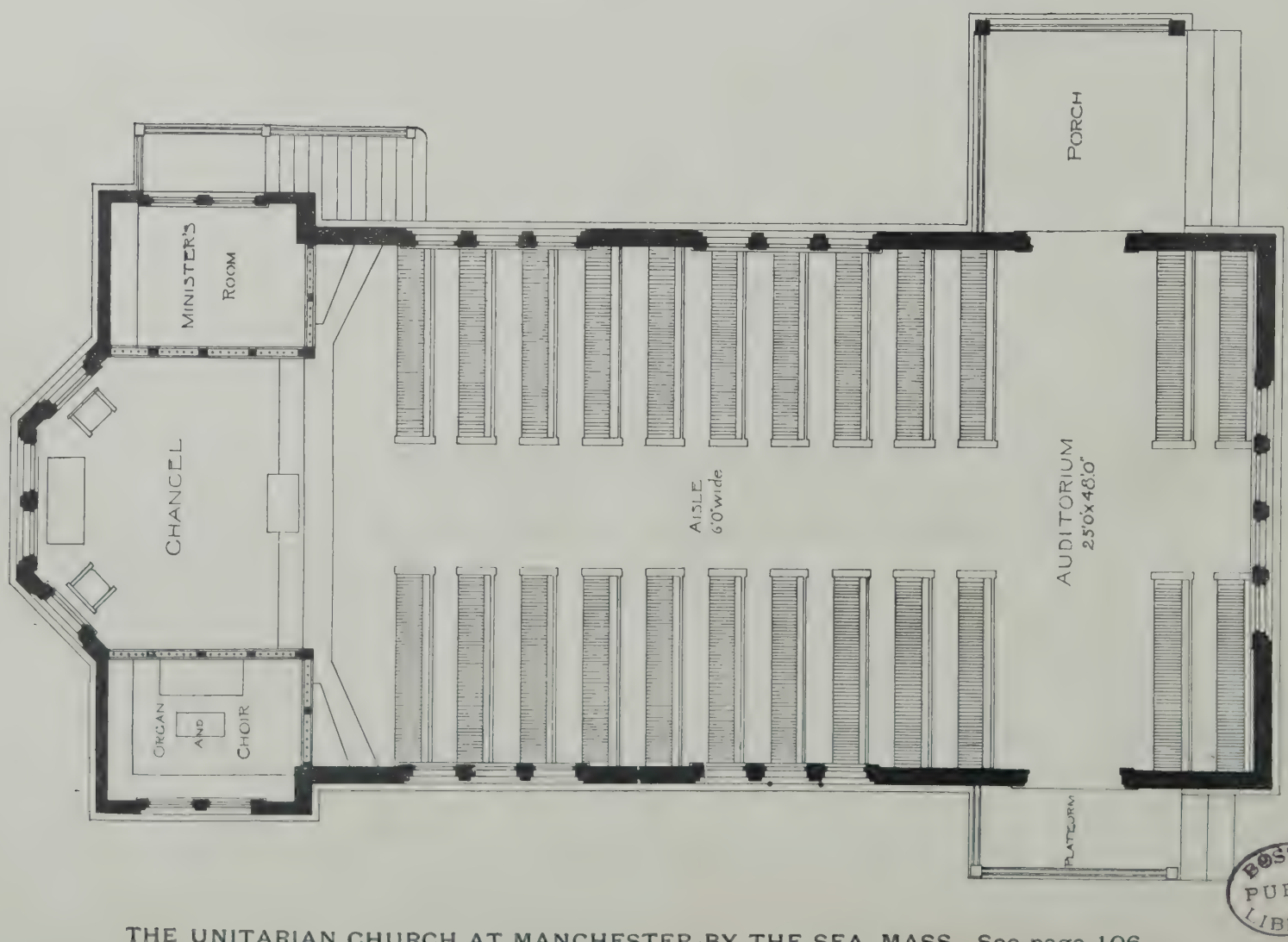
"MUSIC," BALLROOM CEILING, BY E. H. BLASHFIELD.

(Continued on page 105.)



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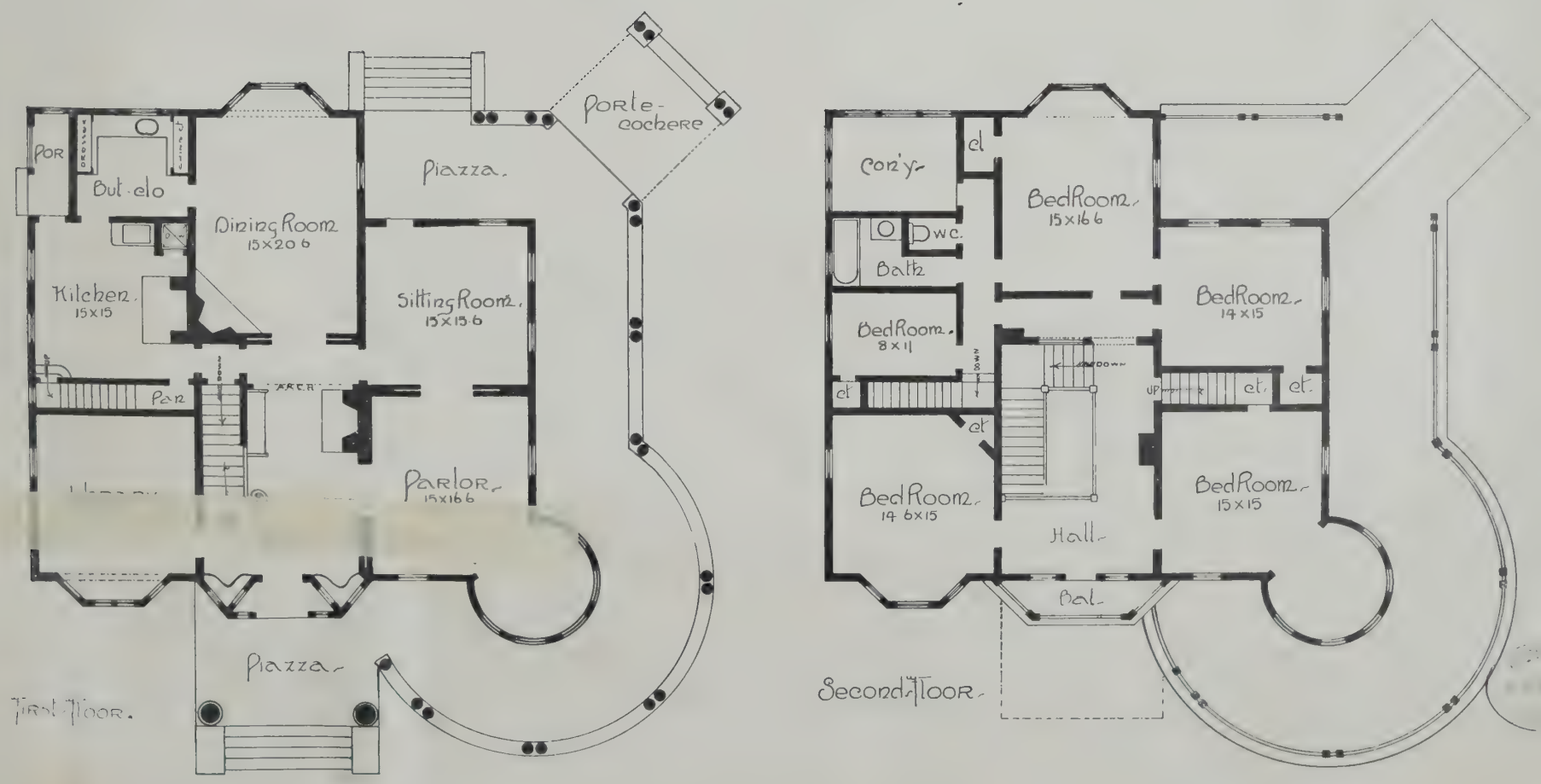
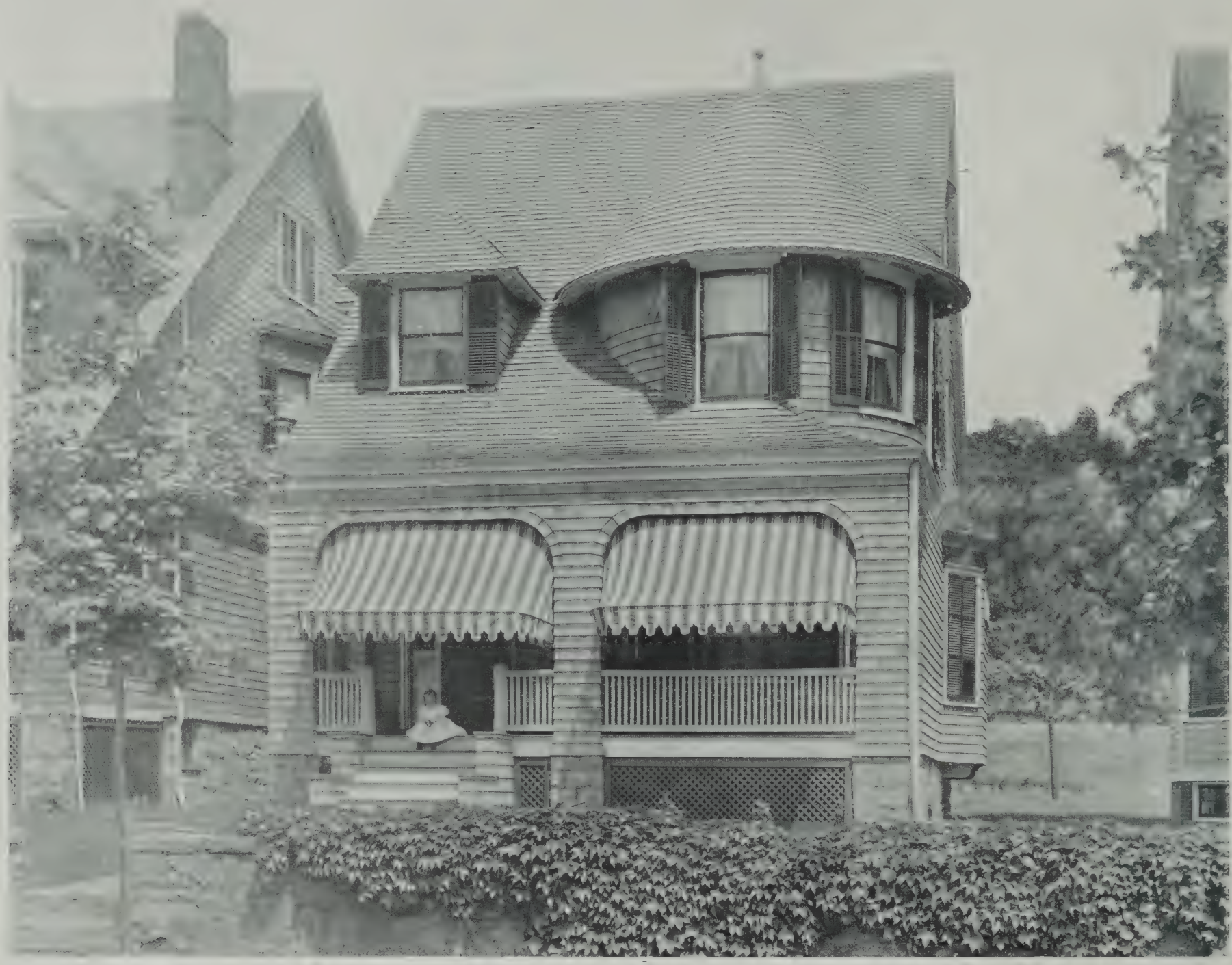
THE UNITARIAN CHURCH AT MANCHESTER-BY-THE-SEA, MASS.—See page 106.



A RESIDENCE AT HACKENSACK, N. J.—See page 106.



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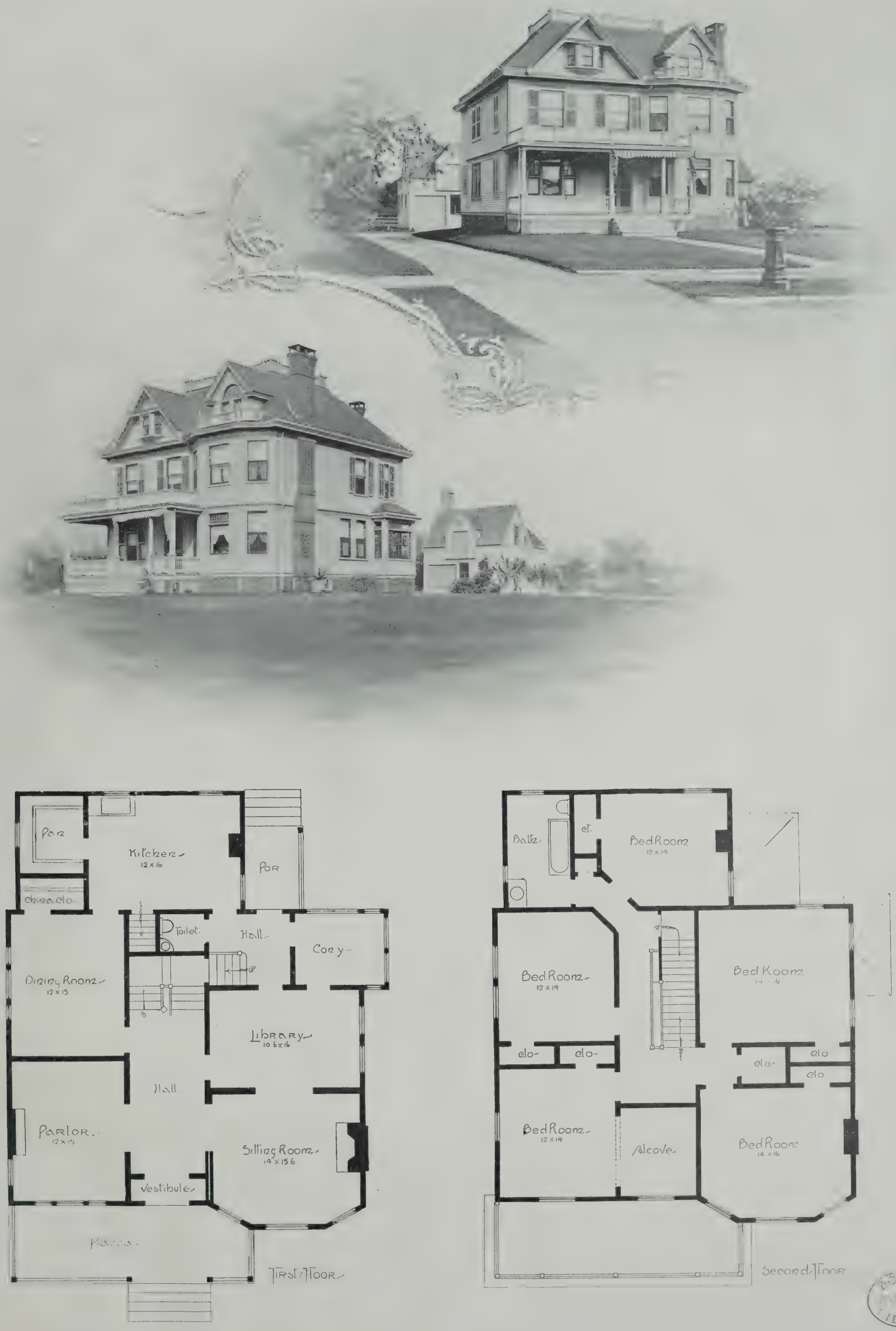
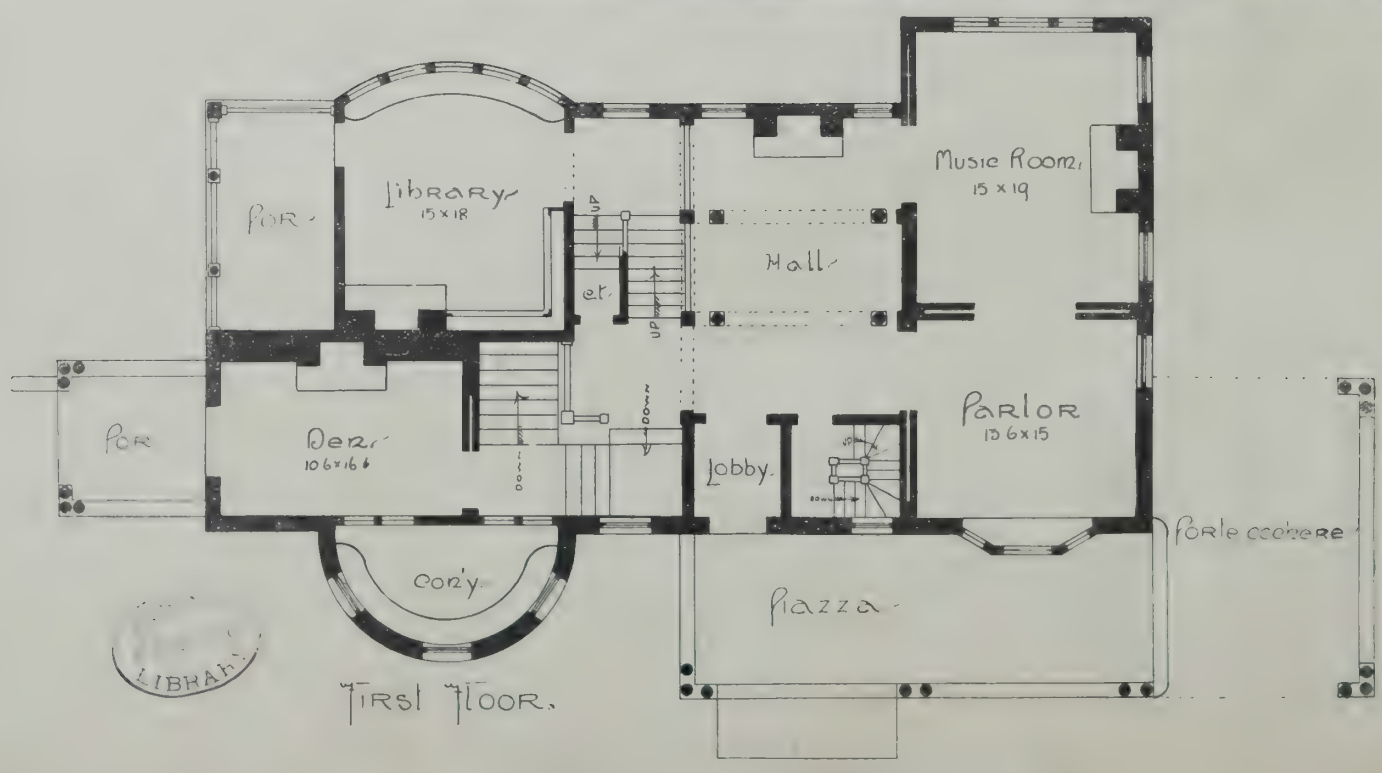
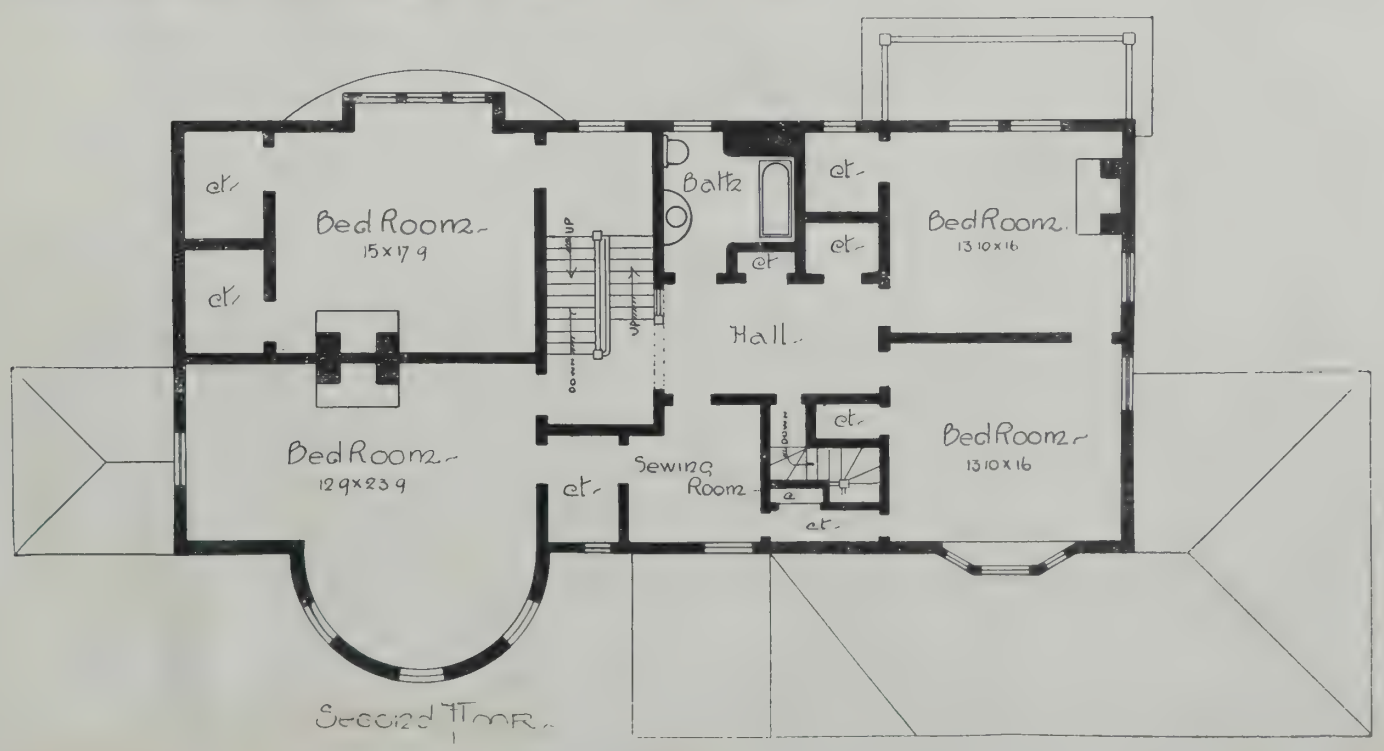
A COTTAGE AT PARK HILL, N. Y.—See page 106.



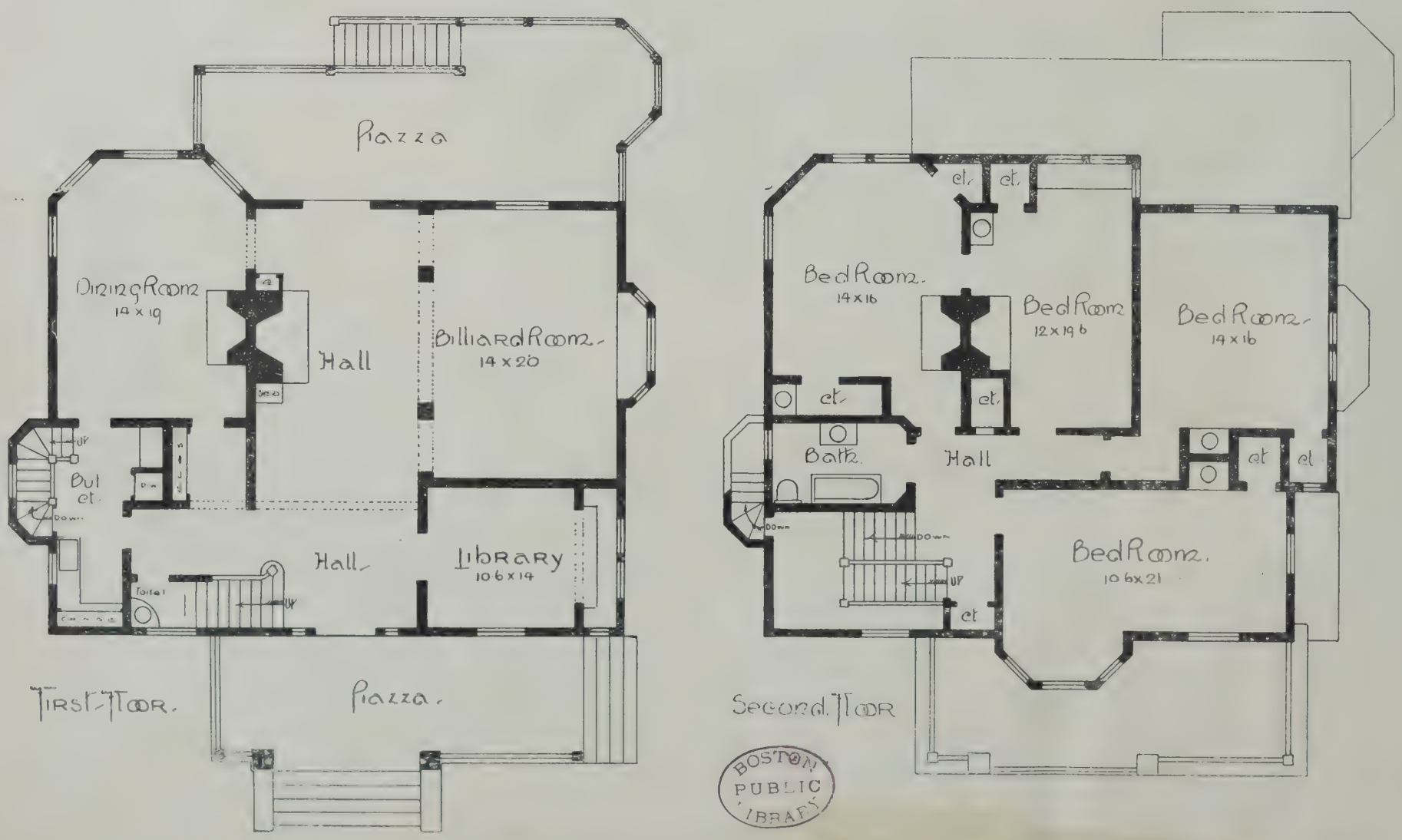
A MODERN RESIDENCE AT BRIDGEPORT, CONN.—See page 106.



A RESIDENCE AT ENGLEWOOD, N. J.—See page 105.



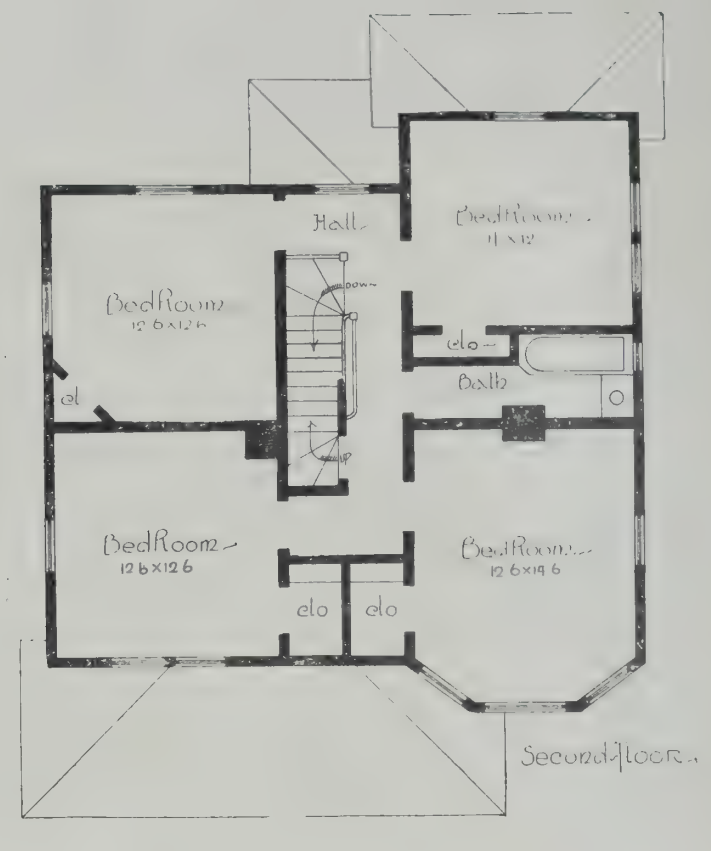
A RESIDEN AT ENGLEWOOD, N. J.—See page 105.

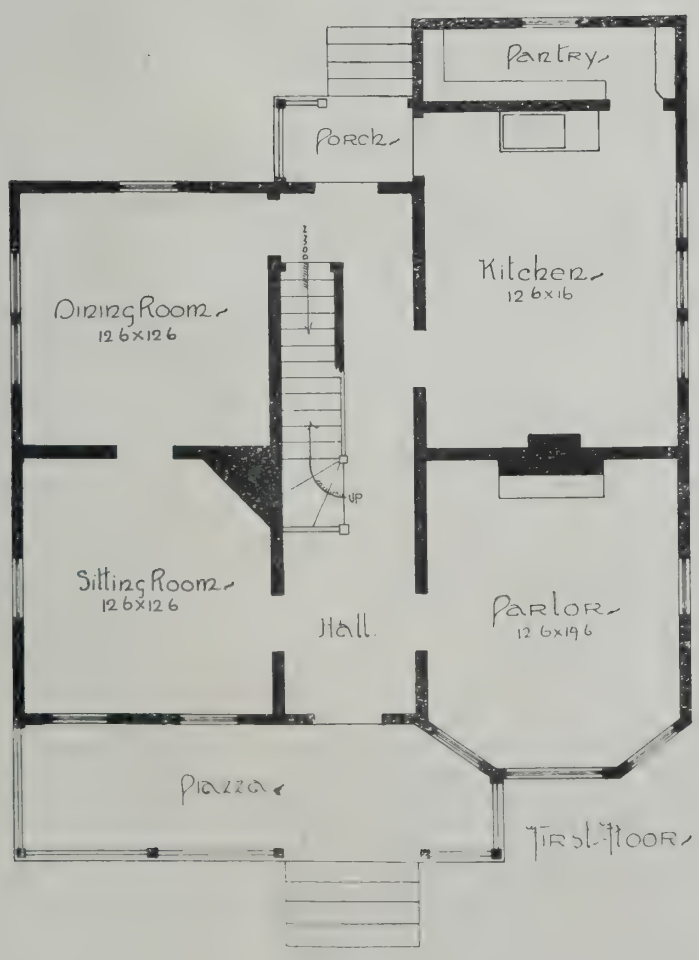


BOSTON PUBLIC LIBRARY

A SUMMER HOME AT NYACK, N. Y.—See page 105.

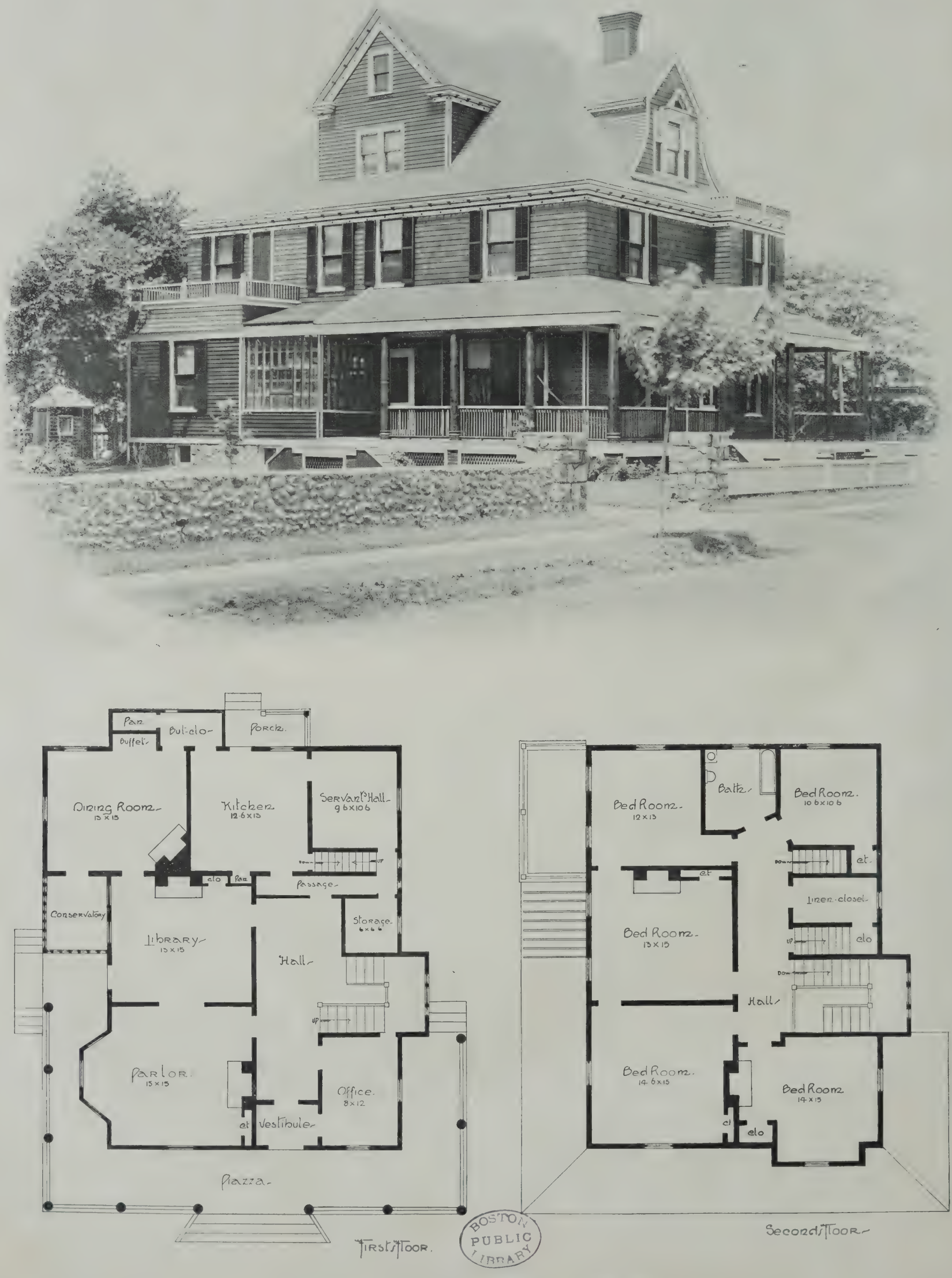
J.—See





BOSTON PUBLIC LIBRARY

A MODERN DWELLING AT DERBY, CONN.—See page 106.



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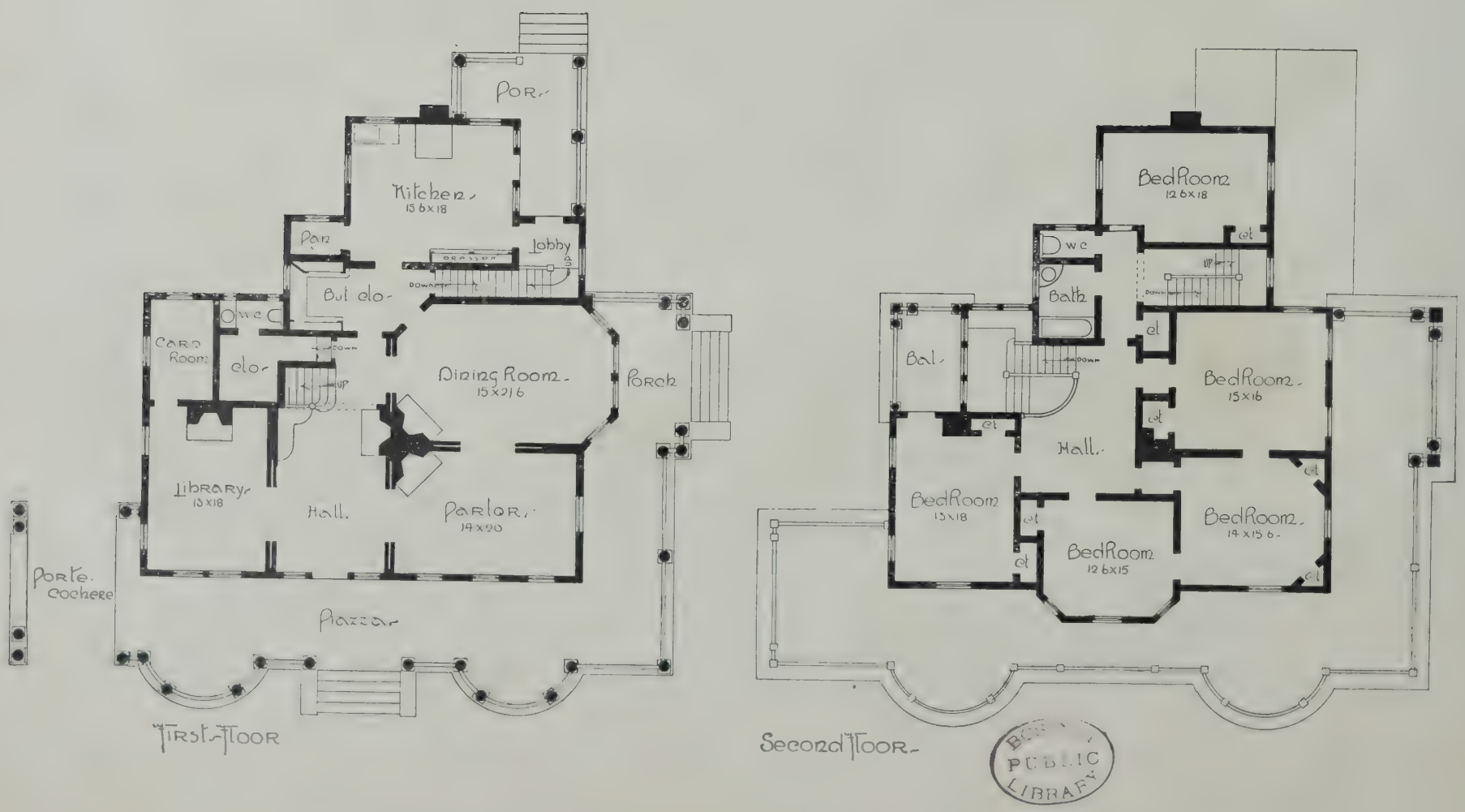
A RESIDENCE AT RICHMOND HILL, L. I.—See page 106.

THE ASTORIA IN COURSE OF CONSTRUCTION.

ERECTING BALLROOM TRUSS.

FRAME OF CORNER TOWER.

THE ASTORIA HOTEL, NEW YORK CITY.—See page 92.



A RESIDENCE AT WEST END, LONG BRANCH, N. J.—See page 106.

THE ASTORIA HOTEL, NEW YORK CITY.

(*Continued from Page 93.*)

known as the Astor Gallery. This is an exceedingly beautiful room, measuring 37 feet by 102 feet, and two stories, or 26 feet, in height. The decorations are carried out in the style of the Hotel Soubise, built in Paris between the periods of Louis Quinze and Louis Seize.

The general color scheme consists of a pleasing harmony of blue, gray, and gold. At one end is a musician's gallery, and down the northern side are seven handsome French windows reaching from floor to ceiling. Here we are introduced to another notable American artist, Edward Simmons, who has enriched the pendentive panels at the base of the curved ceiling and the four panels at either end of the room with characteristic paintings representing the twelve months of the year and the four seasons. This room, with its many mural paintings, rivals in chaste beauty the famous rooms in the palaces of France and Italy.

A door in the east end of the Astor Gallery leads to the "Myrtle Room," designed in the Louis Seize style, and furnished in delicate green and white. This, as its name indicates, is intended for wedding celebrations. East of this is the east foyer, 25 by 55 feet, finished in Caen stone, and beyond this is the east parlor, 32 by 36 feet, roccco in style, with panels of yellow brocade. Returning to the west, one finds opposite the Astor Gallery the Colonial dining-room, 40 by 45 feet, finished in crimson and white. To the west again is the ballroom foyer, 38 feet square, standing at the head of the handsome ballroom staircase, with its steps and rails of Sienna marble.

From the third to the thirteenth floor are the bedrooms and suites of apartments. Nearly all of the former have a private bathroom, and the suites with their private entrance halls and many appointments of convenience and luxury are among the finest in existence. On the fourteenth floor is the club foyer, snugly upholstered in leather, with a billiard-room containing one English and five American tables. On the Fifth Avenue side of this floor is a lecture-room with a stage, on which is a range and stove for use in lectures on cooking. The western end of the fifteenth floor is taken up by the great "Sun Parlor," a large hall with an arched and glass-covered roof, furnished with Wakefield rattan furniture and shaded by palms and hanging curtains.

The heating and ventilating plant is claimed to be the most elaborate and costly installed in any existing building. The fresh air is sent through the building by five Sturtevant blowers, one of 12 feet diameter of wheel, and four of 10 foot wheel. The exhausting is done by three 9 foot and two 8 foot blowers of the same type, and by seven Blackman exhaust fans, varying in diameter of wheel from 3½ feet to 6 feet. The total quantity of air moved each hour is 14,000,000 cubic feet, and the fresh air shaft has a cross sectional area of 150 square feet.

The boiler plant consists of Babcock & Wilcox boilers, aggregating some 3,000 horse power. The electrical plant aggregates 2,200 horse power, and electricity is used for lighting, ventilating, and elevator service. There are eighteen elevators in the house.

An idea of the size of the electric lighting installation may be gathered from the fact that it includes 7,500 outlets which serve a total of 15 000 lights. The circuit wiring has been arranged with the object of individualizing each floor or portion of floor, and in some cases even single rooms. The switchboard is 50 feet long, and the power and lighting circuits are separately provided for. The generating plant has a capacity of 1,300 kilowatts. It is supplemented by a storage battery giving sufficient reserve to cover all possible emergencies. The generators alone can carry a load equivalent to from 20,000 to 25,000 sixteen candle-power lights, and the storage battery increases the capacity about 50 per cent. The plant includes four Corliss engines, each direct connected to a 250 kilowatt generator, and two engines driving two 100 kilowatt generators. One-third of the current generated is used to drive the electric motors, which operate the elevators, ventilators, laundry machinery, and other plants.

The equipment of electric signals, annunciator bells, telephones, etc., is one of the most, if not the most, elaborate in the world. The circuits have been designed with the idea of subdividing each floor into "districts," each of which has its local station. These stations are "interconnected" by trunk lines, and they are also connected with the main central or operating station which is located on the mezzanine floor. Here the trunk lines converge from all directions. At each floor the lines also converge to a local or floor office. At each local office there are several hundred lines, aggregating some four thousand lines. The connections are such that a call from any room is recorded at both the local floor office and main central station on the mezzanine floor.

For the information upon which this article is based, we are indebted to the courtesy of the architect, Mr. H. J. Hardenberg, of New York.

A SUMMER HOME AT NYACK, N. Y.

We present herewith, on page 100, "Baynham," the summer home of Mrs. W. R. Woodward, at Nyack, N. Y. The elevations are attractive and the plans are well arranged for a summer home. The underpinning is built of rockfaced stone and brick, while the exterior framework above is covered with clapboards and painted colonial yellow, with white trimmings. The roof is covered with slates. Dimensions: Front, 45 ft.; side, 36 ft., not including piazzas. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior is trimmed in a simple manner with oak. The treatment is of the colonial style. The hall is a spacious apartment, separated from billiard-room by massive columns rising to ceilings. This hall contains an ornamental staircase, and an open fireplace trimmed with tiled hearth and facings, wrought iron trimmings, and a neat hardwood mantel of colonial style. The toilet, under stairway, is a convenience. The library is a unique little room, with nook and paneled seat. The billiard-room is a large, well lighted apartment, with baywindow and seat thrown out. The dining-room has an open fireplace with tiled trimmings and mantel. These rooms have hardwood floors and cornices. The butler's closet is well fitted up, with stairs and dumb waiter to kitchen, and also, sink, dresser, etc. The kitchen, laundry, and pantries are located in the basement (or cellar), and are fitted up complete with the usual fixtures. This cellar contains furnace, and also other necessary apartments. The second floor contains four bedrooms, large closets, stationary bowls, and bathroom, the latter wainscoted and fitted up with the usual fixtures and exposed plumbing. The third floor contains three bedrooms and ample storage. Cost $8,950 complete. Mr. James B. Simonson, architect, Nyack, N. Y.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT ENGLEWOOD, NEW JERSEY.

We present in this issue, on pages 91, 98, 99, a residence recently erected for William E. Rockwood, Esq., at Englewood, New Jersey. This design is of particular interest, owing to its adaptation to its site, which is a side hill sloping to the rear, thus providing four stories at the rear, while there are but three stories at front, and each story on a different level front and rear. The elevations are of a purely colonial treatment, of a chaste character, and the whole general effect is pleasing, there being many good artistic values attached to the detail work. The underpinning is built of local stone of a soft grayish color, with faces left rough as they came from the quarry. The superstructure, of wood, is covered on the exterior with sheathing paper, and then clapboarded and painted colonial yellow, with ivory white trimmings. The roof is shingled and finished natural. Dimensions: Front, 63 ft. 4 in.; side, 35 ft. 6 in., not including porches, piazza, or porte-cochère. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 9 ft. The entrance is through a vestibule, with paneled walls and ceiling of oak, and a floor laid with mosaic tiling. The main hall is the most elegant apartment, with its very handsomely finished wood, quartered oak, and its massive fluted columns with carved caps, forming a colonnade effect. The walls have paneled wainscotings; above this wainscot the walls are covered with burlap of a deep red hue, rich in color, and harmonizing nicely with the whole color scheme. This burlap is put on with wrought iron nails in a most artistic manner. The fireplace, of Dutch treatment, is furnished with hearth and facings of brownish tinted tile with rough surface, and wrought iron trimmings. The staircase is an ornamental one, and is fitted up with a wrought iron grille railing. The library opens on landing of this staircase, and it is handsomely trimmed with whitewood finished natural. It contains a paneled seat, a pleasant porch at side, bookcases built in and an open fireplace trimmed with tiled hearth and facings and hardwood mantel. The parlor and music-room are treated in the colonial style, with china white and gold, in an exquisite manner; the former has a paneled seat and a window glazed with stained glass of delicate hues, while the latter contains a cluster of windows at one end and an open fireplace fitted up with facings, and hearth of Mexican onyx, and a mantel of excellent design. The den is an artistic apartment, with the walls covered with old red burlap, showing off to advantage the old curios and armor hung thereon. The trim is of oak, and the ceiling is barrel vaulted, and the fireplace is built of Roman brick, with hearth and facings of same. The conservatory is a pleasant feature, and it opens both into hall and den. The windows are glazed with delicate tinted stained glass with excellent effect. The dining-room is next to hall in its attractiveness, and is located beneath library. The circular baywindow at side is provided with a peneled seat, while the other end contains another paneled seat and china closets, with gold leaded glass doors at either side, the whole being very effective. The woodwork is of a deep red mahogany. Another attractive feature is the domed-shaped ceiling, and also the fireplace, which is built of brick of a rough surface, and of a greenish tone in coloring, and furnished with brass trimmings and carved mantel. The second floor contains three bedrooms, sewing room, large closets and bathroom, and one guest's room, with two large closets over library and off landing of main staircase. These apartments are treated in delicate colors, and are fitted up in the best possible manner. The bathroom has a floor paved and a wainscot of tiles; it is provided with porcelain fixtures and exposed plumbing. Third floor contains a billiard-room and servants' apartments. The basement, besides containing dining-room, has as its apartments butler's closet, kitchen, laundry, storage cellar, furnace-

INTERIOR VIEW OF RESIDENCE, WEST END, LONG BRANCH.—See page 106.

room, and all the necessary apartments and fixtures. Messrs. Detwiller & Melendy, architects, 97 Nassau street, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT HACKENSACK, N. J.

We present in this issue, as a subject for colors, and also on page 95, a residence recently erected for C. E. Eckerson, Esq., at Prospect Avenue, Hackensack, N. J. It is situated upon what is called Hackensack Heights, commanding a view of the town and surrounding country. The building is not only notable in point of its artistic elegance and comfort, but for its architectural grace, which makes it worthy of being classed with the best type of residences in the country. The attractive features of the building are the spacious piazzas, bays, dormers, the graceful tower, and the high entrance portico, with massive colonial columns and Corinthian caps. The underpinning and all stonework where shown are constructed of rockfaced stone, mottled effect with old reds, brown and grays. The superstructure is constructed of wood, with the exterior framework sheathed and papered, and then shingled. This shingle work is treated with a medium dark-brown color, soft in tone and effect, while the trimmings are painted light cream white The roof is treated with a moss green effect. Dimensions: Front, 48 ft; side, 48 ft., not including porte-cochère and piazza. Height of ceilings: Cellar, 8 ft.; first story, 11 ft.; second, 9 ft. 6 in.; third, 9 ft. The interior is finished throughout with quartered oak, and the special features are the main hall and staircase. The vestibule is angular in shape, forming pleasant nooks, with seats on either side. The fireplace has a tiled hearth and facings, and an ornamental mantel, with a paneled divan opposite same. The staircase is a very handsome one, with spiral turned and fluted newels, and is lighted by delicately tinted glass. The parlor is elegantly trimmed with old colonial casings, with festoon ornaments on heads. It is treated with white and gold, the tower alcove being set off by artistic fretwork grille and portières. The sitting-room is finished in a similar manner and is separated by sliding doors. The library has a large bay window, with art glass transoms and a hardwood floor with border. The dining-room is trimmed with oak, and a large bay window at end adds spaciousness to the apartment. It contains an open fireplace trimmed with tiled hearth and facings, and a large colonial mantel, with columns and wrought iron trimmings. The large butler's pantry, supplied with dressers with glass doors, having drawers and small closet under same, and kitchen, are trimmed and wainscoted with whitewood, finished natural. These two latter apartments are provided with all the necessary fixtures and appliances. The second floor contains a large, open hall, four bedrooms servants' bedroom, large closets, conservatory and bathroom. The conservatory is inclosed with portable frames of glass which can be removed and the space converted into a balcony. A private stairway connects the kitchen with servants' quarters. The bathroom is wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains numerous apartments and ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Mr. William A. Lambert, architect, No. 99 Nassau Street, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT WEST END, LONG BRANCH, N. J.

We present herewith, in this issue, on pages 104–105, a residence which has been erected for V. Henry Rothschild, Esq., at West End, Long Branch, N. J. The design is treated in the colonial style in a most artistic manner. The principal feature is the spacious piazza, which is well ornamented with its swell projections, massive columns, and balustrades. The balcony on second floor, and the roof with its dormer windows and lookout, are also good features. The underpinning is built of red brick laid up in red mortar. The exterior building above is sheathed, covered with paper, and then shingled. This shingle work is left to finish natural, while the trimmings are painted white. The roof is shingled also and finished natural. Dimensions: Front, 52 ft.; side, 50 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior arrangement is most excellent. The hall, broad and spacious, is treated in a neat manner. It is trimmed with white pine, treated in white enamel. The fireplace is trimmed with tiled facing and hearth, and a mantel of unique design, with columns and mirror. The staircase is an ornamental one with white spindle balusters and treads, and a mahogany newel post and rail. A seat is also shown at side. The parlor is trimmed with white pine and treated in white. The fireplace is furnished with tiles and mantel. The library is trimmed with oak. It has bookcases built in, and an open fireplace with the usual fixtures. A card room adjoining is fitted up in a convenient manner. The dining-room is trimmed with oak, and it has the usual appointments. The fireplace is handsomely furnished, with tiled hearth and facings, and mantel. The floors throughout are of hard pine, handsomely finished. The toilet is conveniently located. The kitchen and pantries are trimmed and wainscoted with North Carolina pine and finished natural. These apartments are furnished with the best appointments. The second floor is trimmed with white pine and painted in white. This floor contains five bedrooms and bathroom. The bathroom is wainscoted with marble, and is furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains numerous servant quarters which are finished with cypress. The cemented cellar contains furnace, laundry, and other necessary apartments. Messrs. Brunner & Tryon, architects, No, 36 E. Union Square, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT PARK HILL, NEW YORK.

We present herewith, on page 9[illegible], in this issue, a cottage of modern design which has been erected for J. B. Forsyth, Esq., at Park Hill, New York. The engravings present a design treated in a unique manner, with its long lean-to roof running down and forming a cover for piazza. The circular tower breaking out of roof is also an attractive feature. The underpinning is built of rockfaced bluestone. The exterior framework is sheathed and then covered with shingles and left to weather finish. The trimmings are painted white and the blinds bottle green. The roof is shingled and finished natural. Dimensions: Front, 27 ft. 6 in.; side, 36 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft.; third, 8 ft. The interior arrangement is a most complete one. The hall is trimmed with oak, and it contains an ornamental staircase turned out of similar wood with balusters, rail and newel. The false fireplace is furnished with tiled facings, hearths, and mantel. The parlor is treated in white and gold, and it has a false fireplace trimmed with tiling and a mantel of dainty design. The dining-room is trimmed with oak. It has a fireplace with tiled hearth and facings, and mantel. The kitchen and pantries are trimmed and wainscoted with yellow pine, finished natural, and are furnished with the usual fixtures complete. The second floor is trimmed with white pine, and finished natural. It contains four bedrooms, with large closets and bathroom, the latter wainscoted with tiled effect and finished with exposed nickelplated plumbing. The third floor contains one bedroom and ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Mr. John Forsyth, of Yonkers, was the builder Mr. C. C. Chipman, architect, No. 150 Nassau Street, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN RESIDENCE AT BRIDGEPORT, CONNECTICUT.

We present herewith, on page 97, a modern residence, which has been erected for J. M. Merwin, Esq., at Beardsley Park, Bridgeport, Conn. The elevations are most pleasing and the plans excellent. The underpinning is built of rockfaced bluestone. The exterior framework above is covered with clapboards and painted silver gray, with trimmings of a darker shade. The roof is covered with slate. Dimensions: Front, 38 ft.; side, 47 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. The interior is trimmed throughout with whitewood, and finished a dark cherry. The hall contains an ornamental staircase with turned newels, balusters and rail. The parlor has a false fireplace, with tiled trimmings and mantel. The library and sitting-room are well fitted up, the latter containing an open fireplace with tiled hearth and facings, and a mantel of excellent design of the colonial style, while the former has a conservatory attached thereto. Dining-room is located conveniently, and is connected to kitchen, which is wainscoted with narrow beaded stuff, and finished complete with the usual fixtures. Second floor contains five large bedrooms, six closets, and bathroom; the latter wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. Third floor contains open attic. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost, $5,500 complete. Mr. A. H. Beers, architect, Bridgeport, Conn.

Our engraving was made direct from photographs of the building, taken especially for the SCIENTIFIC AMERICAN.

THE UNITARIAN CHURCH AT MANCHESTER-BY-THE SEA, MASS.

We present on page 94 in this issue the Unitarian Church building, which has been erected at Manchester-by-the-Sea, Mass. The building is an excellent example of the genuine half-timber construction, and it has many good points in features, while the whole is enhanced by the unique little tower rising at side entrance. The walls are framed of white oak in a solid manner, and the panels which show in the exterior are of brick, partly plastered; one row of bricks being left flush with the timbers and not plastered, so that when the timbers should shrink, the opening could be pointed without disturbing the panels. In order to make the building perfectly tight, the oak frame was boarded on the inside with 1¼ inch matched boards, and ordinary studding is set up next to this to carry the lath and plaster. The exterior oak work is stained a dark brown, while the plastering and panels are of a cream color. The roof is carried by hard pine trusses, carved and finished in natural color, and is covered with cedar shingles, left to finish in a natural silvery gray color. The interior woodwork is all quartered oak, with the exception of the trusses already described. The wainscoting is of whitewood, stained a dark brown color. The chancel furniture is of dark quartered oak to match the finish, while the pews are of the same material, but quite light in color. On either side of chancel are conveniently located the minister's robing-room, and choir loft and organ, respectively. The auditorium, 25 x 48 feet, has a seating capacity of 150 persons, with an addition, when necessary. There is a cellar under the rear portion of the building, with an entrance thereto, which provides ample room for furnace if desired. The cost of the building was $5,200, complete. Messrs. J. R. Coolidge, Jr., and V. A. Wright, architects, No. 89 State Street, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN DWELLING AT DERBY, CONN.

We present herewith, in this issue, on page 101, a modern dwelling which has been erected for Mr. Richard Hanley, at Derby, Conn. The elevations are of the modern style with colonial treatment, while the plans are of excellent arrangement, and the interior furnished in a neat manner. The underpinning is built of red brick, laid up neatly in red mortar. The exterior framework is covered with sheathing, paper, and clapboards, and then painted colonial yellow with white trimmings. The roof is shingled and stained green. Dimensions: Front, 32 ft. 4 in.; side, 35 ft. 10 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second 8 ft. 6 in.; third, 8 ft. The interior is trimmed with whitewood throughout. The hall, running through the centre of the house, contains an ornamental staircase turned out of similar wood. The parlor and sitting-room each have neat wood mantels. The dining-room has a corner china closet, and the kitchen and its apartments are wainscoted and trimmed with North Carolina pine and finished natural. These apartments are furnished with the usual fixtures complete. The second floor contains four bedrooms, large closets, and bathroom; the latter wainscoted and fitted up with tub and bowl complete, with exposed plumbing. The third floor is open, and provides ample storage room. Cemented cellar contains the usual apartments. Cost $2,250 complete. Mr. C. S. Beardsley, architect, Bridgeport Savings Bank Building, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

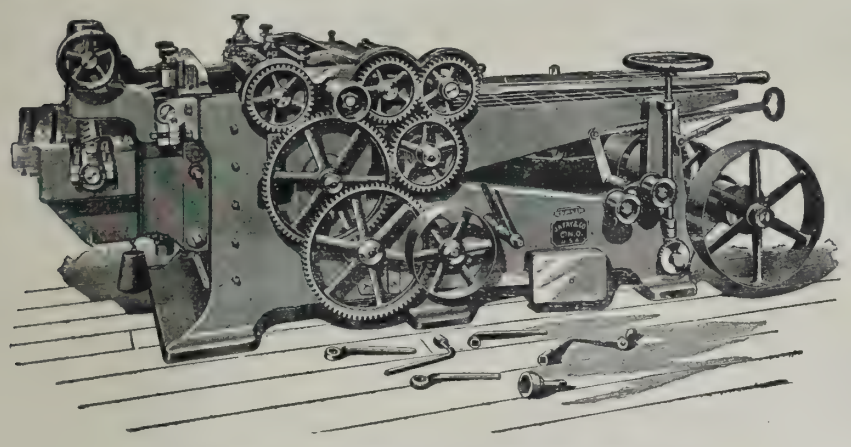
A RESIDENCE AT RICHMOND HILL, L. I.

We present herewith, in this issue, on page 102, an American residence, which has been erected for John Donaldson, Esq., at Richmond Hill, L. I. The engravings present a substantial design, and the plan is most excellent. The underpinning is built of rockfaced bluestone, laid up in a neat manner. The building above is constructed of wood, and the exterior framework is covered with clapboards on the first story and painted a deep red. The second story is covered with cedar shingles and left to weather finish. The roof is also covered with cedar shingles. Dimensions: Front, 39 ft.; side, 48 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The vestibule is trimmed with ash, and it has a paneled wainscoting four feet in height. The hall is trimmed with yellow pine. It contains an ornamental staircase turned out of similar wood. The doors are all two inches thick, and are made of ash, with butternut panels and sunk moldings. The first and second stories have double floors with maple surface. The office at the right of entrance has a separate entrance to vestibule. The walls and ceiling are ceiled up with narrow beaded yellow pine, and finished with hard oil. The parlor is trimmed with cherry. It has an open fireplace, furnished with tiled hearth and facings, and a hardwood mantel with columns. The tiling has wrought-iron trimmings. The library is trimmed with maple, and it has a similar fireplace. The dining-room is trimmed with butternut, and it contains a fireplace and a conservatory well arranged and fitted up replete. The kitchen and its apartments are trimmed and wainscoted with yellow pine, and are furnished with the usual fixtures of the most improved kind. The servants' dining hall is fitted up and trimmed in a similar manner. The second floor is trimmed with yellow pine. It contains five bedrooms, linen closet, and bathroom. The walls and ceiling of the latter are ceiled up with yellow pine, and it is fitted up with the usual fixtures and exposed plumbing. The third floor contains two bedrooms and ample storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Mr. John Donaldson, architect, Richmond Hill, L. I.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

AN IMPROVED WOOD-WORKING MACHINE.

The machine we illustrate herewith, while designed especially for getting out dimension stuff, two pieces at a time, up to 12 inches wide, and 8 inches thick, will work all ordinary ceilings, floorings, as well as can possibly be done on two sides, one piece at a time, stock up to 26 inches wide x 8 inches thick. The rolls are six in number, each 7 inches in diameter. The upper feeding-in rolls are made in two sections, so that two pieces of unequal thickness may be planed at one time. The pressure bar before the cut of the upper cylinder is divided, and just in front of the bars, supported in the housing that carries the bars themselves, are two rolls, 4 inches in diameter, which receive the material, and lift up the bars in the proper manner to receive the stock, should there be too great a variation in the thickness of the material for the bars to take care of it independently. This is a very valuable feature, as with it all tendency to clipping off ends is avoided. The bar, both before and after the cut of the upper cylinder, is adjustable about 1½ inches, so that irregular-shaped knives may be used for working casing and other style of moldings, beaded ceilings, etc.



No. 3½ DOUBLE CYLINDER PLANER AND MATCHER.

The side heads are located just after the upper cutting head, in heavy hangers that are provided with the improved drop-matching attachment for independently lowering the whole matching mechanism below the line of the bed, so as to permit of using the whole width of the machine for surfacing. This drop-matching attachment is counterbalanced, and is easily raised after being lowered. The top plate of the matcher hangers is made independent and bolted to it. When an accident occurs in the use of the machine that results in the breaking of this plate, the plate can be readily removed, and another put in its place, thus avoiding the necessity of having an entirely new hanger in the place of the damaged one. The matcher clip is arranged with an adjustable toe that can be moved to and from the cut; and attached to the clip is a hood to which the shaving exhaust pipe is connected, and which may be removed when necessary to get at the heads, by simply loosening the two bolts shown in the engraving. The machine has just been put on the market by J. A. Fay & Co., 297-317 West Front street, Cincinnati, Ohio, and is in every way fully up to the high standard heretofore maintained by this concern.

Home Study and Education by Mail.

The United Correspondence Schools, of 154 to 158 Fifth avenue, New York, have been established a sufficient time to have attained a wide reputation for the thoroughness of their course of instruction, and the practical efficiency of their system in imparting knowledge to mechanics and others who have been prevented by unavoidable circumstances from realizing the advantages of a course of schooling or professional education. F. W. Ewald & Co. are the proprietors of these schools, and the various courses comprise practical home schools, by means of correspondence, in mechanical, electrical, steam, civil, and sanitary engineering; also hon e schools of art and of architecture, and for sheet metal workers and pattern makers. A large class of ambitious young men are studying by these methods who could not by any other means obtain such advantages, and many thousands have thus been educated in the theory of their trades, making them better men and enabling them to earn higher wages. Instruction papers are furnished free, the lessons are graded according to standing and capacity, and the student's work corrected, constant work being laid out for each correspondent, and full explanations regularly given, although the student is not hurried, and unlimited time is afforded to finish each course, according to the varying ambition and opportunities of the students. The scheme affords a veritable means of obtaining a high-class education at home.

THE PRACTICAL UTILIZATION OF ACETYLENE GAS.

All persons who have had the opportunity of comparing the beautiful, highly efficient light afforded by acetylene gas with that attainable from any other source, not excepting the best that can be obtained from electricity, will be disposed to look with great favor upon any practical means whereby this light may be brought within the reach of the general public, for the lighting of houses stores, halls, churches, etc. Our illustration represents a generator, automatically regulated and controlled, requiring almost absolutely no attention, and which is guaranteed to be entirely safe, but which is designed to furnish this gas in a supply more nearly even and regular than the flow of gas in the city pipes, or the current in the conductors for electric lighting, and at a price said to be fifty per cent. below that of city gas for equal illumination.

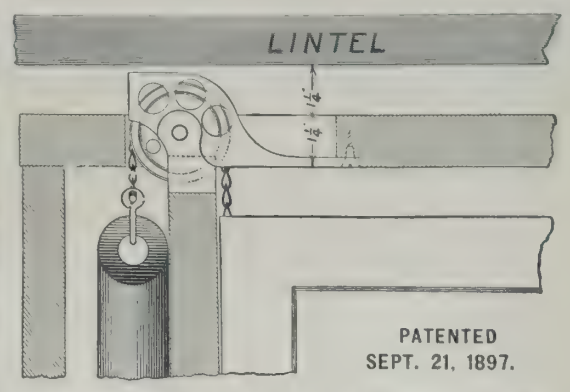
The following are the several parts of the generator, as indicated by the letters: A, ports for admission of carbide; B, ports for removing refuse; C, pressure indicator; D, safety valve; E, valve between generator and gas pressure regulator; F, check-valve to prevent gas backing into water supply; G, pressure reducer, maintaining even pressure on house pipes; H, connection for house supply; I, doors in cage; J, cock to shut off main water supply; K, auxiliary water reservoir; L, au omatic water regulator; M, cock between water reservoir and water regulator; N, cock between check-valve and generator; O, glass windows for observing carbide supply; P, mercury blow-off as extra safety valve; R, sprinkle pipe; T, cock for outlet of air; W, gas exit; X, packing box.

In the upper section of the steel tank is suspended a cylindrical steel cage, in which the carbide of calcium is placed through the ports at the top and the slide doors at the side, the reservoir, K, being supplied with water from any suitable source, and the salt being present to prevent freezing in cold weather. When a certain pressure of the gas is reached, the water supply is automatically cut off, preventing further generation of gas, although a safety valve is provided to allow the gas to escape should the pressure at any time become too high. Each day the cage should be turned over, by means of the handle shown at the right, while the recharging with carbide will be necessary, ordinarily, only three or four times a year.

It is said that the United States Government is rapidly installing this system for making and burning acetylene gas in the Philadelphia sub-postoffices, and for detailed or individual plants it seems to offer great advantages. No alterations are needed in the piping of a house, save the substitution of acetylene burners for those in use with other gas. Messrs. J. B. Colt & Co. (James B. Colt, Charles Goodyear), 115–117 Nassau street, New York, are the sole American agents of the Napheys system and manufacturers of the apparatus.

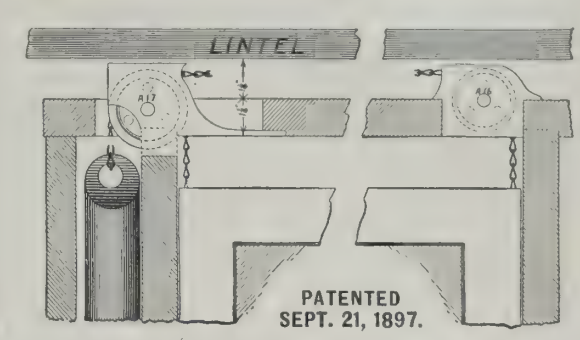
A PERFECT WINDOW PULLEY.

The illustration represents an overhead pulley which can be placed in any window in which the ordinary side pulley can be used, the iron and steel work in any building not interfering at all with the action of the pulley. It is manufactured by the Queen Sash Balance Company, No. 150 Nassau Street, New York city. No extra space or head room need be allowed by the architect when specifying this pulley, and a large amount of pocket room is gained over the side pulley, thus doing away with lead weights and reducing the cost. The pulley is concealed from view when in use, and the least possible space is left around the pulley, preventing the entrance of air and insects. The Mullion frame pulley, shown in one of the views, is designed to do away with the Mullion



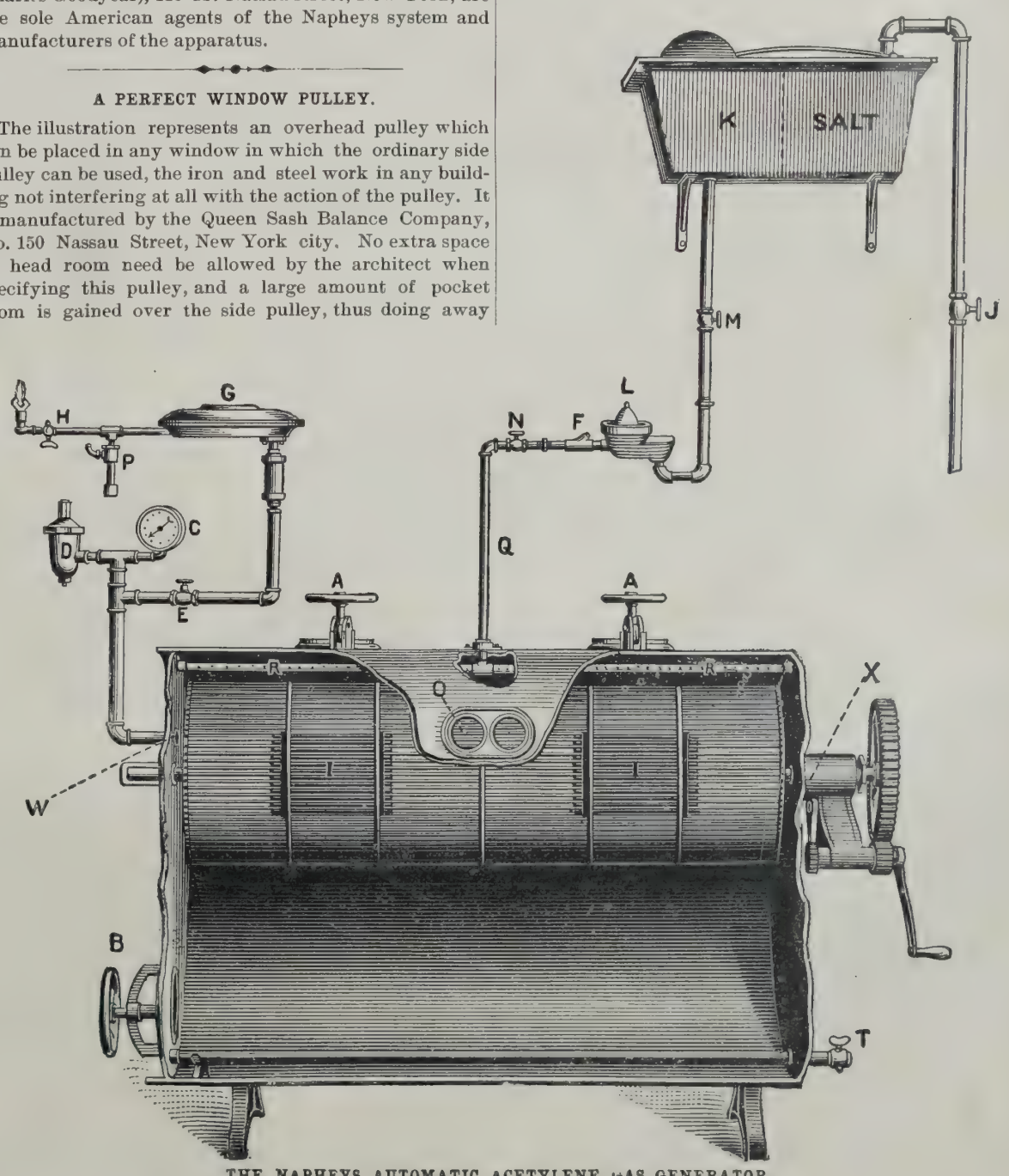
THE QUEEN OVERHEAD PULLEY—SINGLE FRAME.

pocket in twin windows, the sashes being operated by one weight with the same result as by using two weights, thus giving six to eight inches more glass space than by ordinary methods. The company, under the keenest competition as to quality and merit alone, has secured



THE QUEEN OVERHEAD PULLEY—MULLION FRAME.

contracts for the placing of the Queen pulleys on several notable new structures, such as the Dun Building, Harding & Gooch, architects; the Passaic County Court House, Paterson, N. J., S. B. Reed, architect; Bellevue Hospital, Cady, Berg & See, architects; two schools at Flushing, L. I., Wallace & Gage, architects, and others.



THE NAPHEYS AUTOMATIC ACETYLENE GAS GENERATOR.

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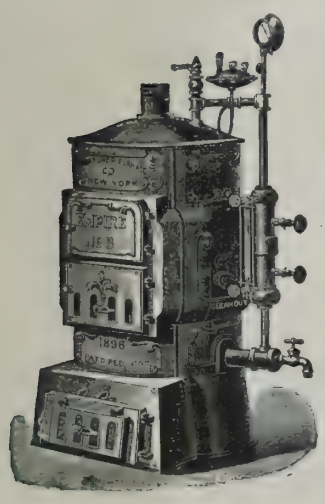

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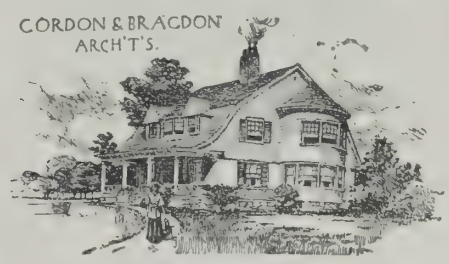

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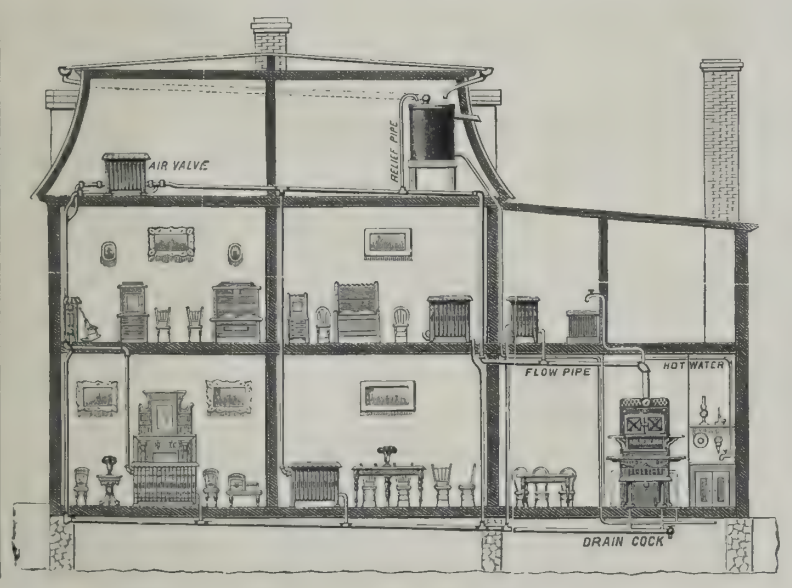

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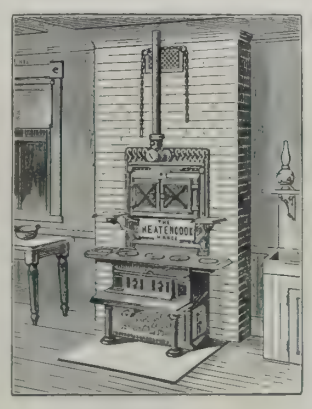

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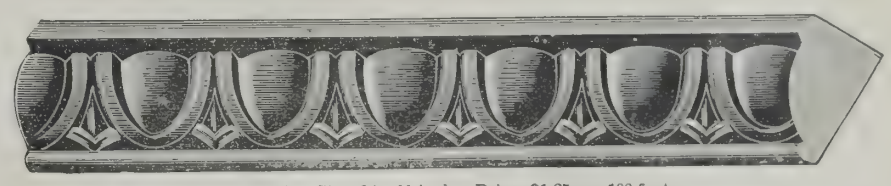

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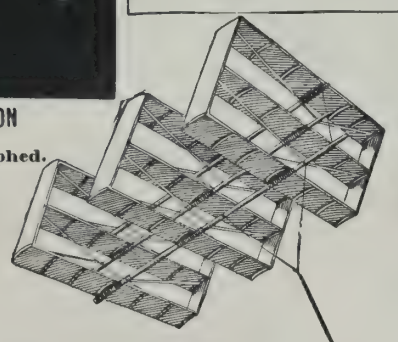

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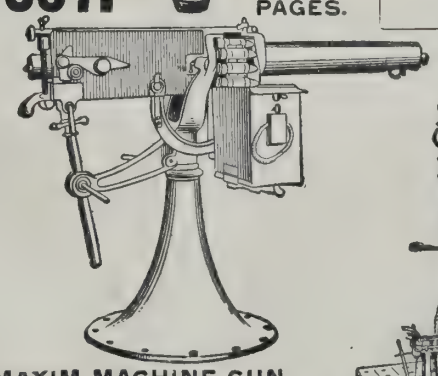

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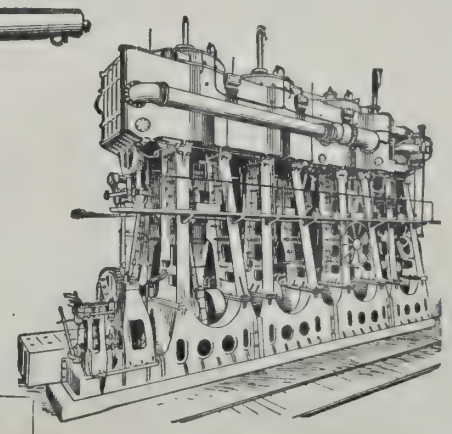

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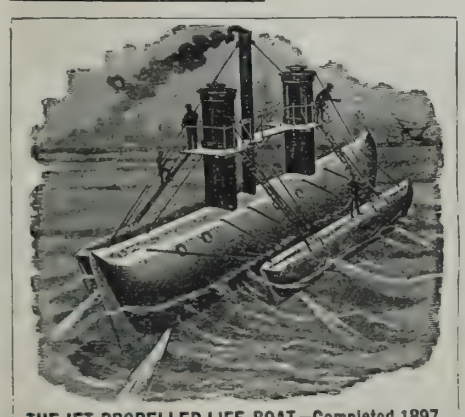

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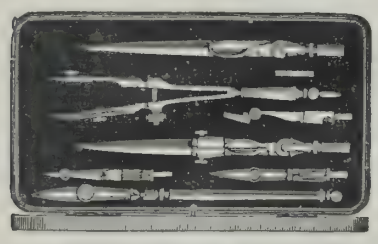

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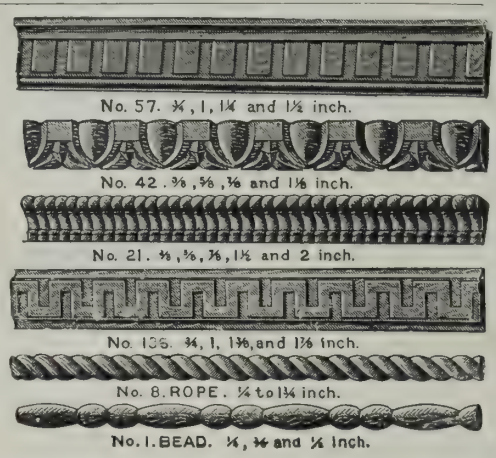

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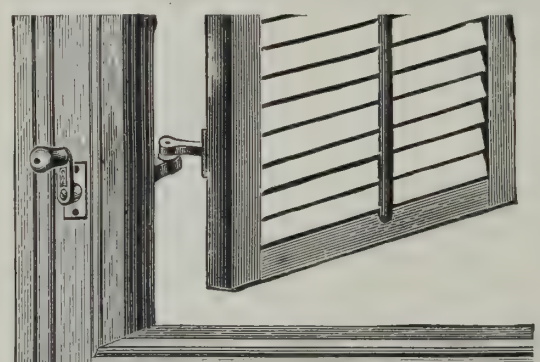

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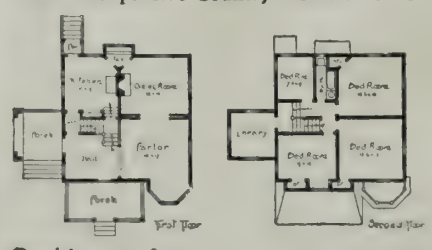

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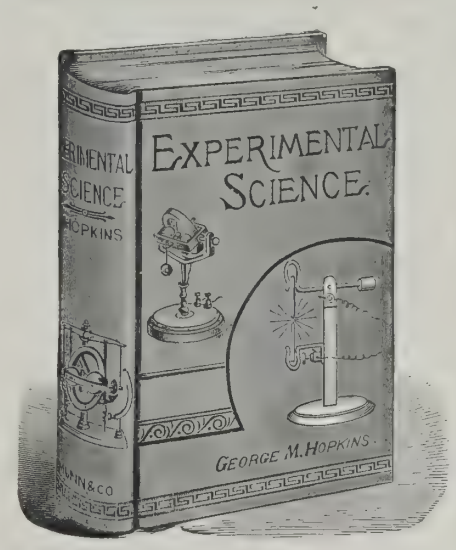

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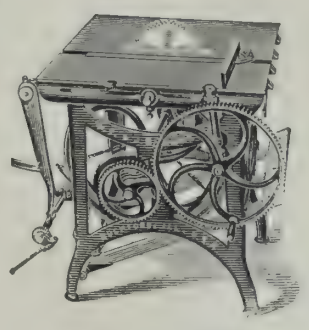

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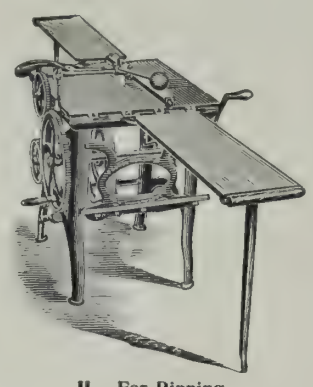

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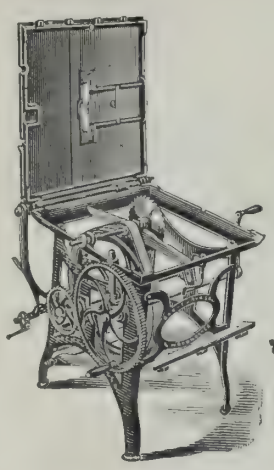

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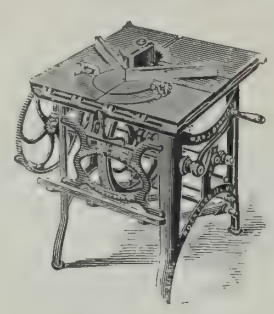

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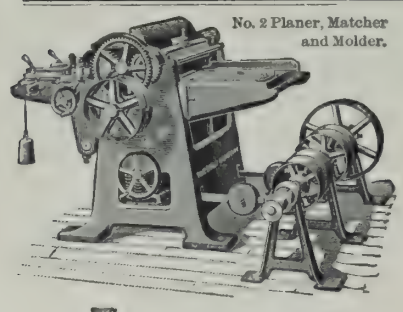
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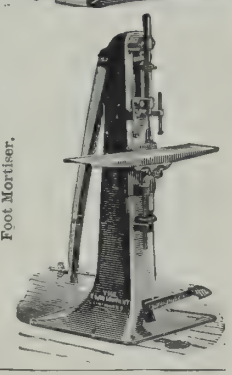
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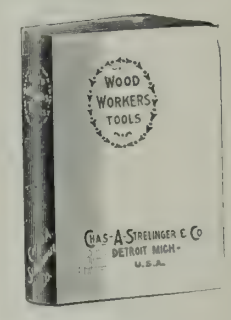

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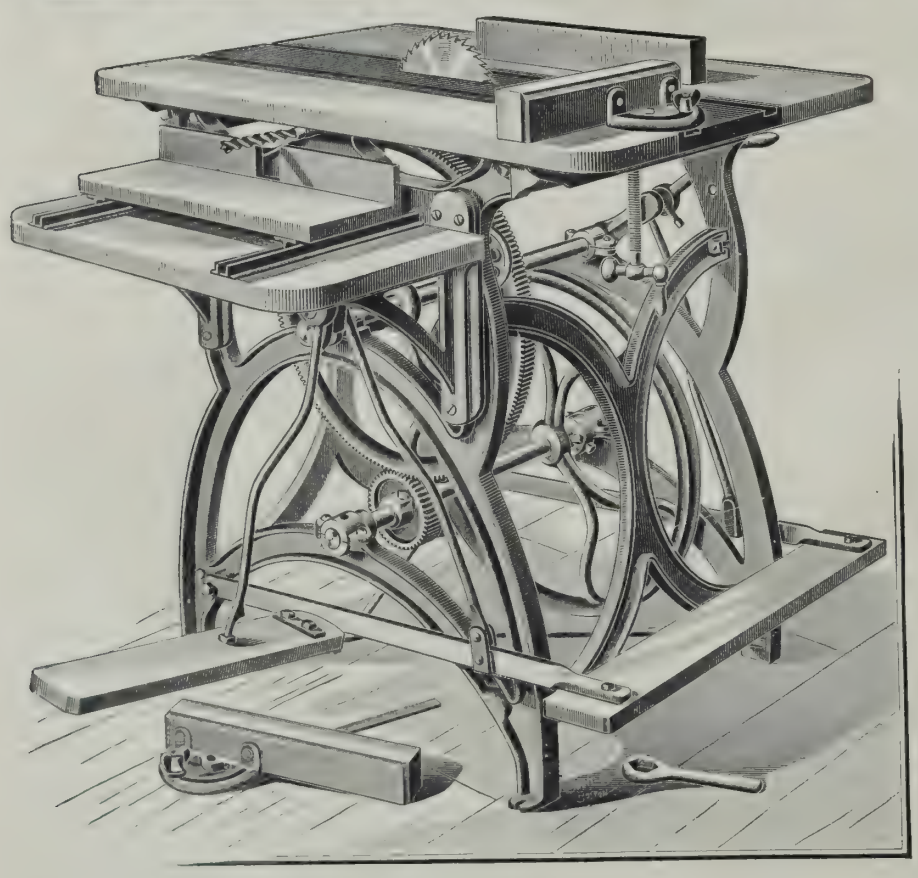

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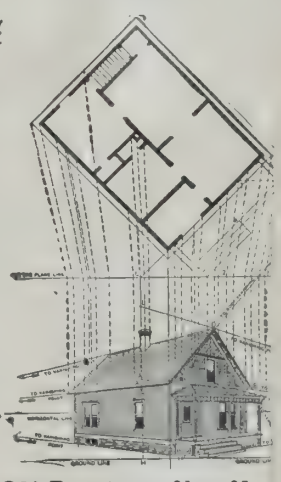

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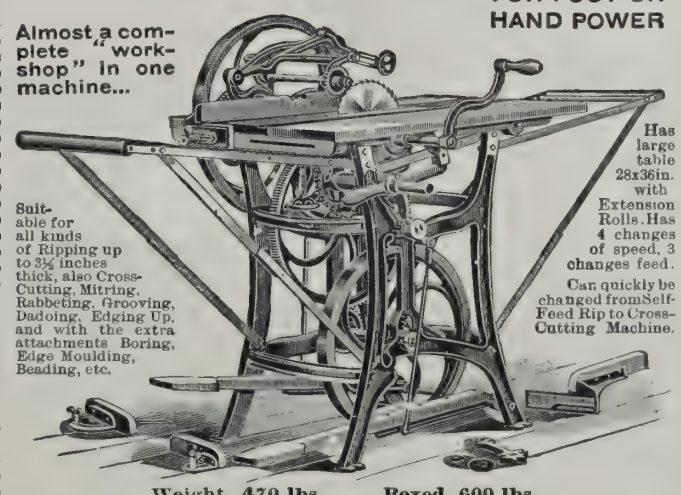

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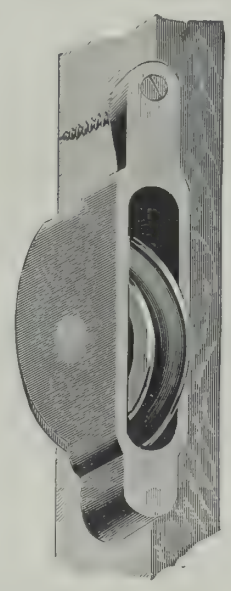

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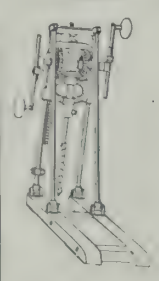

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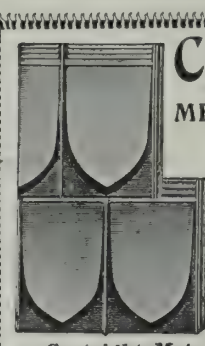

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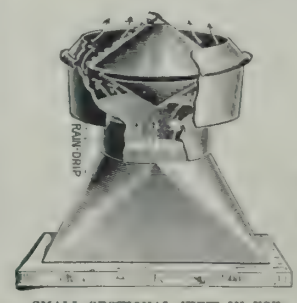

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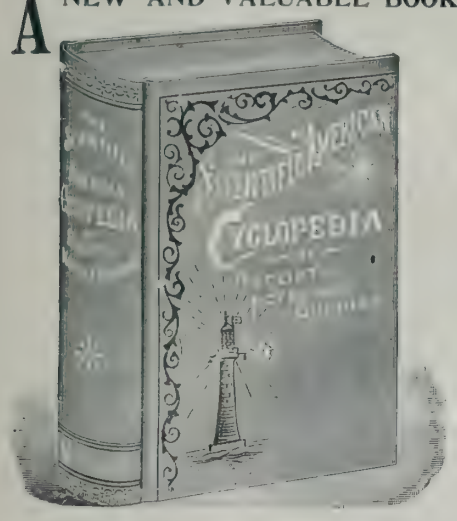

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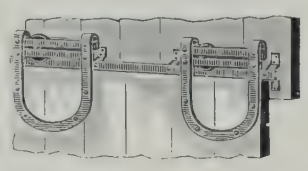

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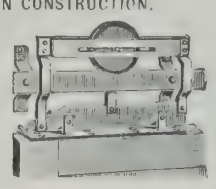

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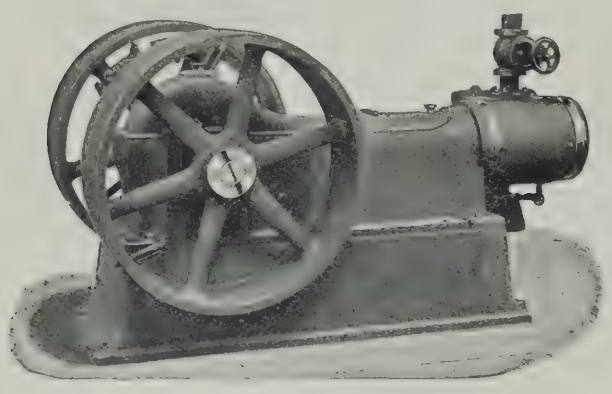

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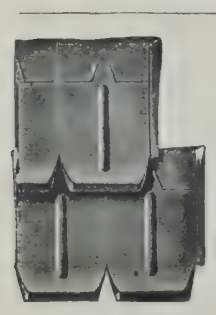

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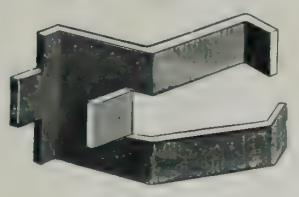

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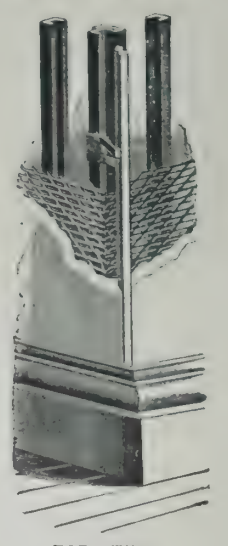

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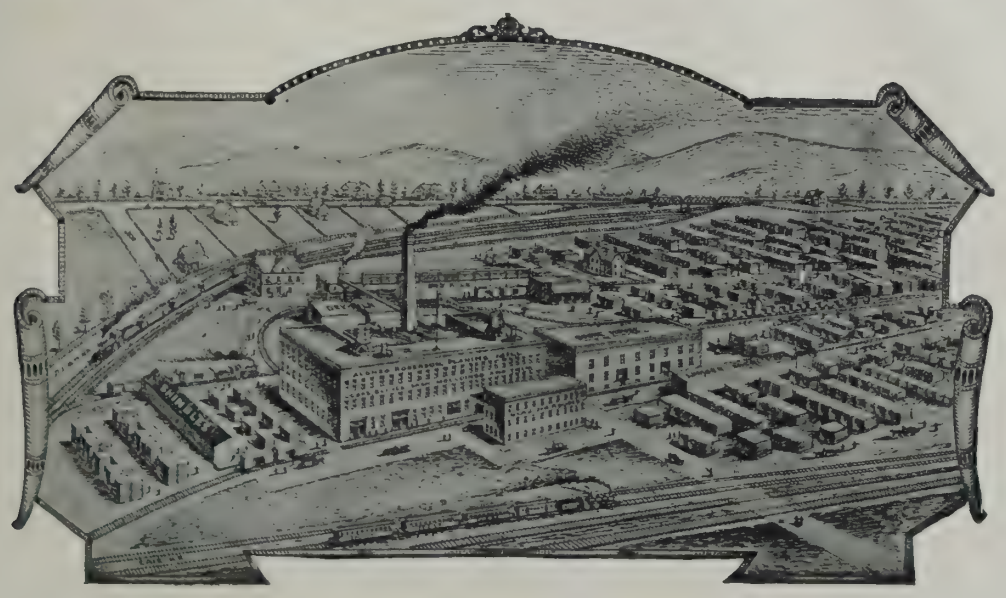

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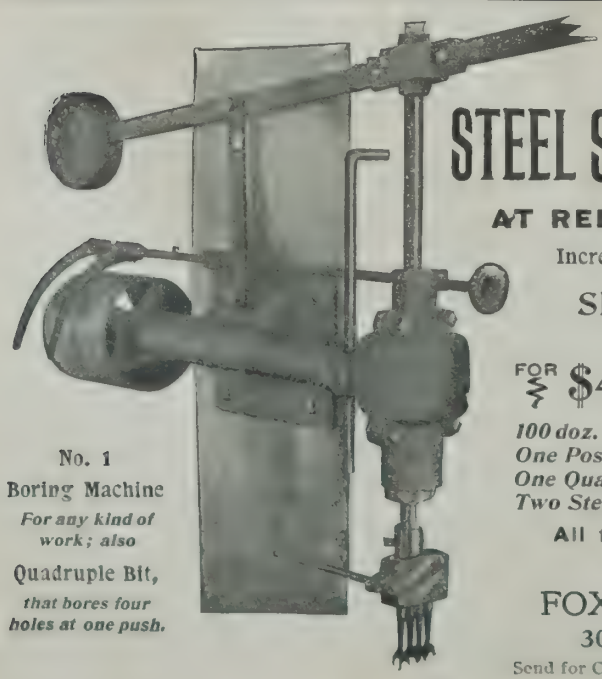

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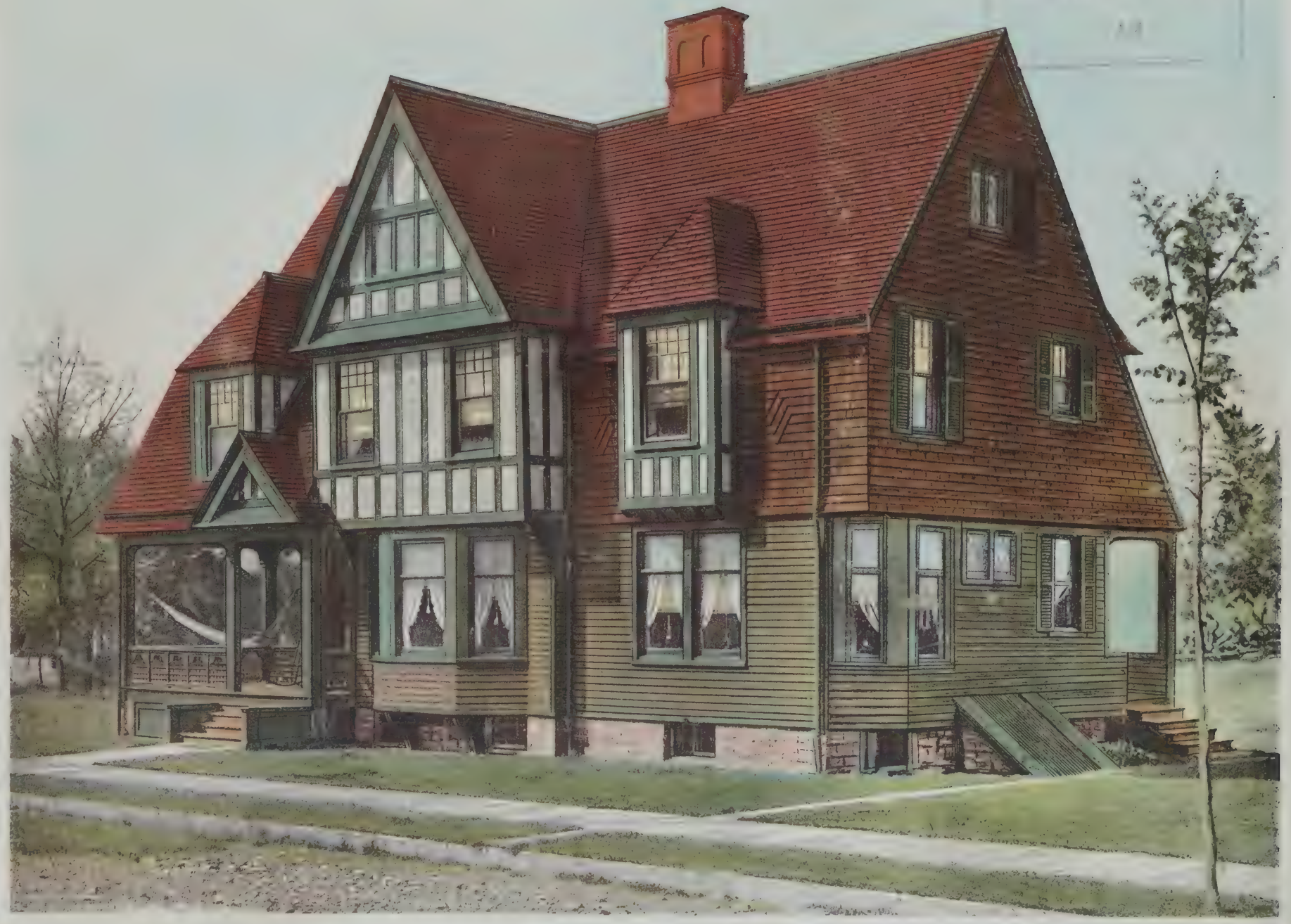

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